

AD/A-006 643

PROTECTING THE U.S. PETROLEUM
MARKET AGAINST FUTURE DENIALS OF
IMPORTS

Horst Mendershausen, et al

RAND Corporation

Prepared for:

Department of Defense

October 1974

DISTRIBUTED BY:

NTIS

National Technical Information Service
U. S. DEPARTMENT OF COMMERCE

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER R-1603-ARPA	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER ADIA-006643
4. TITLE (and Subtitle) Protecting the U.S. Petroleum Market Against Future Denials of Imports		5. TYPE OF REPORT & PERIOD COVERED Interim
7. AUTHOR(s) Horst Mendershausen and Richard Nehring		6. PERFORMING ORG. REPORT NUMBER
9. PERFORMING ORGANIZATION NAME AND ADDRESS The Rand Corporation 1700 Main Street Santa Monica, Ca. 90406		8. CONTRACT OR GRANT NUMBER(s) DAHC15-73-C-0181
11. CONTROLLING OFFICE NAME AND ADDRESS Defense Advanced Research Projects Agency Department of Defense Arlington, Va. 22209		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		12. REPORT DATE October 1974
		13. NUMBER OF PAGES 110
		15. SECURITY CLASS. (of this report) UNCLASSIFIED
		15a. DECLASSIFICATION DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) Approved for Public Release; Distribution Unlimited		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report) No restrictions		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Crude Oil Petroleum Industry International Trade Energy Stockpiling Reserves International Relations		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) see reverse side		

Reproduced by
NATIONAL TECHNICAL
INFORMATION SERVICE
US Department of Commerce
Springfield, VA. 22151

PRICES SUBJECT TO CHANGE

DD FORM 1 JAN 73 1473

EDITION OF 1 NOV 65 IS OBSOLETE

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE(When Data Entered)

Considers precautionary policies to counter the threat of future disruptions in the supply of U.S. oil imports. Such disruptions are highly possible, since the conditions that produced the Arab embargo of 1973-74 have not been eliminated. The authors review the recent oil embargo and U.S. responses to it, examine the history of U.S. petroleum imports, and weigh the outlook for future imports by source and relative vulnerability. On the basis of this examination, they discuss various policies that could be implemented to counter future embargoes, emphasizing a precautionary import policy to partially control the sources of U.S. imports.
(Author)

1a

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE(When Data Entered)

R-1603-ARPA
October 1974

Protecting the U. S. Petroleum Market Against Future Denials of Imports

Horst Mendershausen and Richard Nehring

A Report prepared for
DEFENSE ADVANCED RESEARCH PROJECTS AGENCY

Rand
SANTA MONICA, CA. 90406

PREFACE

The 1973-1974 Arab oil embargo sharply underscored the vulnerable dependence of U.S. oil consumers, domestic and military, on oil imports. The research in this report was undertaken to examine the possibility of similar disruptions in oil imports up to 1985, and to consider policies that could counter them. The report was prepared for the Defense Advanced Research Projects Agency as part of The Rand Corporation's research into selected topics in the international political and economic aspects of the energy situation. The research was performed under Rand's ongoing Energy Program.

SUMMARY

The main argument advanced in this report is that the threat of a disruption of U.S. oil imports, in particular another Arab embargo, is highly possible during the remaining years of this decade. To anticipate it U.S. policy should include a precautionary import policy influencing the origin of our imports in the steady state, as well as measures for substituting other oil imports for supplies that might be withheld. The report focuses on the lessons of the recent crisis and on the difficult period of transition from the present to those future years, 1980 or 1985, into which various observers project the restoration of some kind of world oil "equilibrium."

Section I of the report reviews the 1973 embargo, its advent, direct impact, and termination. Section II analyzes the responses of the U.S. Government and oil companies and the reasons for the absence of a counterembargo import policy; the efforts at "consumer country cooperation" and their ineffectuality in easing the supply predicament; the braking of domestic oil consumption, which was the only immediately available means of coping with the predicament in the given circumstances; and the turn toward domestic supply expansion as a longer-run adaptation.

To provide the historical base for future oil import policy, Sec. III examines the flow of U.S. petroleum imports from 1955 to 1973, overall and by countries of origin, and the development of import policy during that period. It traces the emergence of Eastern Hemisphere, in particular Arab, sources of origin as a significant contributor to U.S. import supply, quite apart from their importance as a supply base for U.S.-based oil companies that sell oil in Europe, Asia, and other parts of the world.

In developing an outlook on future U.S. imports and their vulnerability in the years immediately ahead (1974 to 1985), Sec. IV postulates relatively "favorable" developments with regard to the growth of consumption (a one or two percent annual growth rate in place of the recent five percent rate) and a growth of domestic petroleum supplies

Preceding page blank

that appears possible over this short span of time (25 percent or more). The section presents a range of year-by-year trajectories of aggregate petroleum imports on the basis of these and other assumptions. Although those trajectories of total imports point generally downward, after a hump in the years 1975 to 1977, and thus deviate significantly from the substantial increases in U.S. imports suggested by some parties for the remainder of this decade, they point to the likelihood of greater than 1973 imports from the Eastern Hemisphere, notably Saudi Arabia. Our analysis of unfavorable policy, production, and export trends in Canada, Venezuela, and other countries shows why, even with a downward trend in total imports, U.S. vulnerability to an interruption of Arab oil shipments may well be greater in the near future than heretofore--and a fortiori if imports were to boom. Section IV also examines the political difficulties that make it imprudent to count on U.S. foreign policy exertions as a miracle machine that will keep this vulnerability from being exploited.

For a time the relationship between foreign and energy policy may operate in a sense exactly opposite to that advanced at the proclamation of "Project Independence"--foreign policy straining to stave off another embargo, rather than to achieve a return to self-sufficiency that would make foreign policy embargo-proof. A gradual movement toward lesser import dependence, however, such as that reflected in the trajectories, would give promise to a precautionary import policy and improve the chances for a desirable reversal of the relationship. In leading up to such a policy, Sec. V considers how emergency oil stockpiling and reestablishment of a domestic reserve production capacity could diminish embargo vulnerability. A stockpile program would appear very sensible and not necessarily too expensive, but because of supply shortages--from steel plates for tanks to the oil to be stored--it is unlikely to provide enough protection soon enough. Efforts to restore domestic reserve production capacity hold out little promise under foreseeable circumstances.

The objective of a precautionary import policy would be to increase the share of U.S. oil imports from non-Arab sources during the remainder of this decade. Within the frame of a conservative, generally

downward trend of total oil imports, such a policy would seek to avoid an increasing concentration of U.S. imports on Arab sources. The report argues that such a policy would be compatible with a U.S. policy of seeking to induce Arab countries to make increasing oil supplies available for export, because it would in no way obstruct the traditional flow of the bulk of Arab oil exports, and the company activities serving it, to European and Asian markets. Such a policy would also harmonize with the evident French, British, German, and Japanese endeavors to assure themselves of ample supplies of Arab oil, endeavors that the United States finds it hard to brake without straining alliance relationships. The argument that a precautionary import policy favoring non-Arab oil flows to the United States would sacrifice predictably cheaper sources of supply is found to be invalid under the current circumstances of the world oil industry. Positively, the policy would seek to enhance the flow of U.S. imports from such countries as Nigeria, Indonesia, and Iran, where developments are more or less favorable, and to stem the decline of imports from Canada and Venezuela in the near future. The report examines governmental and company factors bearing on the opportunities for this approach in these countries, as well as the prospects of competition by import demands from Western Europe and Japan.

The report does not propose that the precautionary import policy be articulated through any formal schemes of trade discrimination, such as differential tariffs or country quotas. Such measures may prove to be unworkable as well as politically and economically counterproductive. Instead it proposes that the U.S. Government "nudge" certain producing countries and companies to increase the flow of non-Arab oil to the U.S. market, and that it encourage this flow by incidental market opening measures.

Elements of the "nudging" policy range from expressions of positive governmental interest in the more desirable import flows to encouragement of investments serving them and to longer-term contracts implementing them. They also include preferences in development assistance, military assistance, and other matters of interest to the governments involved. Incidental market opening or preserving measures might

include support for the construction of a trans-Rockies pipeline from the West Coast, to avoid the possibility that increasing availability of oil from Alaska and perhaps Californian offshore sources will deflect Indonesian supplies away from the West Coast to Japan and elsewhere. The report indicates the direction of these policy measures but does not investigate specific steps in their domestic or bilateral contexts. Nor does it attempt to propose specific quantitative targets of import composition by country of origin. Such tasks should be tackled if the general terms of the policy were found to be of interest.

Section V deals with preparations for import policy during a future embargo. Some fall in the field of domestic institutional rearrangements, notably the development of appropriate mechanisms of cooperation between government and oil companies. Other preparations could take the form of negotiating emergency supply agreements with certain countries to be actuated in a future Arab embargo; the central goal here would be to prevent the burden of supply disruptions from again falling principally on domestic consumption.

Like stockpiling, a precautionary U.S. import policy of the kind outlined in this report could reconcile a continued reliance of the U.S. market on substantial oil imports, albeit at a restrained total level--and thus avoidance of the costs of a drive for oil autarky--with a greater measure of security from politically inspired supply disruptions in the years immediately ahead. Such an import policy can also be seen as a positive alliance strategy, because the United States could then stop competing with its allies for Middle East oil and start to build an emergency reserve capacity its allies could draw on in the future.

CONTENTS

PREFACE	iii
SUMMARY	v
Section	
I. THE 1973 ARAB OIL EMBARGO	1
Advent of the Embargo	1
Are Future Import Disruptions Likely?	4
II. U.S. RESPONSE TO THE 1973 EMBARGO	6
Lack of Counterembargo Import Policy	7
"Consumer Country Cooperation"	14
Putting Brakes on Domestic Consumption	18
Projecting Domestic Supply Expansion: "Project Independence"	23
III. U.S. PETROLEUM IMPORTS, 1955-1973	27
Overall Imports	27
Imports by Areas and Countries of Origin	31
Perspective of Exporting Countries	44
IV. OUTLOOK ON FUTURE IMPORTS AND THEIR VULNERABILITY, 1974 TO 1985	49
Trajectories of Total Imports	50
Composition of Future Imports by Source	56
Production and Exports of Arab Countries	63
U.S. Vulnerability to Embargo in the Near Future	65
V. PRECAUTIONARY IMPORT POLICIES	71
Precautionary Energy Policy in General	71
Emergency Stocks and Domestic Reserve Production Capacity	72
Precautionary Import Diversification	75
Preparations for a Future Counterembargo Policy	88
VI. U.S. EMBARGO IMMUNITY AS AN ALLIANCE STRATEGY	91
Appendix	
A. MONTHLY U.S. OIL IMPORTS DURING THE ARAB EMBARGO, 1973-1974	95
B. SOURCES AND CHARACTERISTICS OF DATA	96
C. IMPORTS OF CRUDE OIL AND PETROLEUM PRODUCTS INTO THE UNITED STATES BY COUNTRY AND REGION, 1950-1973	98

I. THE 1973 ARAB OIL EMBARGO

ADVENT OF THE EMBARGO

Little more than a week after the beginning of the October 1973 war against Israel, the governments of Saudi Arabia and other Arab oil-producing countries announced that they were stopping all oil exports going directly or indirectly to U.S. destinations.* The result was a drastic reduction in U.S. oil imports from these countries during the first quarter of 1974.† In that quarter U.S. direct imports of oil from Arab countries averaged only 65,000 barrels per day (b/d), as against one million barrels per day during the 10 months preceding the embargo (January through October 1973). In the same quarter, U.S. imports of oil from all foreign countries dropped to an average of 5.3 million b/d from a figure of 6.2 million during the preembargo period (see Table 1).

* According to press reports, announcements to this effect came from Abu Dhabi on October 18, from Libya on October 19, from Saudi Arabia and Algeria on October 20, and from Kuwait, Bahrein, Qatar, and Dubai on October 21. While the step was undoubtedly agreed upon among the 10 members of the Organization of Arab Petroleum Exporting Countries (OAPEC), who collectively announced production cutbacks after a meeting of their petroleum ministers in Kuwait on October 17, the embargo against the United States was not announced collectively. No U.S. embargo announcement was recorded from Iraq, although together with Algeria and Libya it reportedly pressed for the embargo at Kuwait, nor from Egypt and Syria (which are insubstantial oil exporters). Dubai was not a member of OAPEC at the time, but rejoined it in June 1974 through the "expansion" of Abu Dhabi's membership to include all of the United Arab Emirates. With these qualifications, and with due allowance for the fact that the decisive action was that of a single member, Saudi Arabia, one may describe the embargo against the United States as an OAPEC measure.

† Suspension of the embargo was announced on March 18, 1974, by the oil ministers of seven Arab countries meeting in Vienna: Saudi Arabia, Algeria, Abu Dhabi, Bahrein, Egypt, Qatar, and Kuwait. Libya and Syria opposed the decision, and apparently continued their embargoes. Iraq and Dubai, absent from the meeting, made no announcements to our knowledge. Libya's embargo seems to be continuing at the time of writing. *The Petroleum Economist*, April 1974.

Table 1

U.S. OIL IMPORTS, CRUDE AND PRODUCTS, JANUARY-OCTOBER 1973
AND JANUARY-MARCH 1974

(In thousand barrels/day)

Originating Country of Shipment	January-October 1973	January-March 1974
Arab countries		
Algeria	154.9	3.5
Bahrein	11.2	---
Egypt	17.4	---
Iraq	5.0	---
Kuwait	51.0	---
Libya	181.6	7.1
Oman	.2	---
Qatar	7.6	---
Saudi Arabia	501.2	49.1
United Arab Emirates	74.2	3.4
Yemen	2.0	1.5
Total, Arab countries	1006.2	64.6
Non-Arab countries		
Canada	1332.0	1155.1
Venezuela	1079.3	1106.1
Bahamas	169.0	161.7
Trinidad	250.6	200.1
Virgin Islands	317.4	355.0
Netherlands Antilles	565.1	601.6
Nigeria	452.1	460.6
Indonesia	207.3	280.9
Iran	195.9	396.3
Italy	122.1	101.9
Total, non-Arab countries ^a	5156.0	5200.3
Total, all countries	6162.2	5264.9

SOURCE: U.S. Bureau of Mines. (See Appendix B.)

^aListed and unlisted.

The embargo was undoubtedly effective in keeping both crude oil of Arab origin and the bulk of petroleum products refined from Arab crude in Europe or the West Indies from reaching the U.S. market during the embargo period.* Appendix A reveals the extent of its effectiveness so far as published statistics can do so.

The embargo did not initiate the time of troubles for the U.S. energy economy. That period began in 1972 and early 1973 as domestic demand--increasing at an annual rate of 7 percent during the year and a half preceding the embargo--ran into supply bottlenecks caused by governmental and company maldispositions, and as troubles became manifest in the form of shortages, hoarding, and other disturbances. During that time, oil imports increased rapidly: by 21 percent from 1971 to 1972, and by 33 percent from January-October 1972 to January-October 1973 (50 percent for crude oil, 18 percent for products).† One-third of the increase (for crude only) came from Arab countries, chiefly Saudi Arabia. The Arab embargo directly jeopardized 28 percent of U.S. imports of crude oil and indirectly reduced a substantial part of the imports of petroleum products as well. The embargo's impact on U.S. total (civilian and military) oil supplies has been estimated at about 12 percent.‡

* From the point of view of U.S. *receipts* of shipments, the embargo period extended roughly from December 1973 through April 1974, since variable periods of time elapsed between embargo announcements and the U.S. arrival of the last pre-embargo shipments afloat, as well as between embargo lifting and first arrivals of tankers at U.S. ports. The first major post-embargo shipment arrived from Algeria on April 10, 1974.

† U.S. Department of the Interior, Bureau of Mines, *Mineral Industry Surveys*, January 28, 1974.

‡ Estimated loss of 2 million b/d out of a consumption rate of 17 million b/d. Department of the Interior and Foreign Petroleum Supply Committee (major oil companies) estimate, appearing in *The New York Times*, October 31, 1973. Other ex ante estimates ran higher, to 14 percent or more, by including in the loss the *hoped-for* increases in fuel oil shipments from European refineries during the winter (500,000 b/d) besides the pre-embargo rate of all direct and indirect Arab oil shipments to the United States (1.6 million b/d), overseas supplies of such oil to the military (300,000 b/d), and restrictions of imports from Canada (about 100,000 b/d). Statement of George M. Bennis of the State Department before the House Foreign Affairs Committee, November 29, 1973 (press release).

The embargo and the accompanying sharp increases in international oil prices propelled the already troubled state of the U.S. energy economy into a crisis. It put an end to the running debate over whether an energy crisis was impending or had arrived. "Energy crisis" became a household term; government, oil companies, and other agencies reacted to shortages in various ways; and the country experienced manifold inconveniences--in some places, hardships--plus forebodings of worse things to come. In quantitative terms, the supply disruption was not as grave as, say, a stoppage of Canadian and other Western Hemisphere shipments would have been (the immediate source of 76 percent of January-October 1973 imports and the original source of 60 to 65 percent of imports during this period). But with a look to the future, it seemed hardly less grave; pre-crisis forecasts of U.S. import needs had implied quantities of Arab oil in the years ahead no less than the recent imports from the Western Hemisphere, if not more.

ARE FUTURE IMPORT DISRUPTIONS LIKELY?

Future disruptions of U.S. oil imports are possible. Almost any one of the oil-exporting countries could be drawn into a war or a civil war, or a conflict with the United States, that might bring its exports to a halt. But individual country stoppages of exports do not necessarily pose a very severe problem--perhaps not even group embargoes *per se*. There being a variety of possible sources of imports, apart from domestic production, the U.S. market could, in principle, draw on substitute suppliers when one or several countries drop out. The significant threat, as the recent Arab embargo demonstrated, is the withdrawal of a large source of supply at a time when substitution possibilities are very limited and U.S. policy factors impede the exploitation of the possibilities that do exist. To forecast a real danger of import supply disruption therefore entails making a forecast of difficulties with an entire international constellation, not simply troubles in or with one country. (We return to this question in Sec. IV.)

The cold truth is that the Arabs may reimpose the embargo in the near future, in a few years or even months, simply because the circumstances that brought about the 1973 embargo may not change greatly in

such a short span of time. The Arab-Israeli conflict is far from resolved. Arab rulers may well renew their pressure on U.S. foreign policy by renewing the embargo. Their last effort was not unproductive, and the objectives they pursue or to which they feel compelled to pay obeisance may be virtually limitless.* Alternative sources of oil may still be inelastic, and competing demands from other importing countries great. Some remedial developments and tendencies that got under way during the last embargo and that might, if pursued, help forestall a future one, may fall by the wayside as the worst shortages recede into the past and perhaps give way to temporary insouciance, albeit at higher oil prices. That hazard puts the focus on U.S. supply protection policies during the years immediately ahead, which may be considered an interim period lasting until a time when increasing domestic supplies may have come to reduce dependence on imports.

Given the real possibility of future Arab embargoes, the United States should adopt supply protection policies that would deter or frustrate them. What should those policies consist of, and how should they be orchestrated with policies serving other objectives? What precautionary policies should be considered, and what embargo-fighting policies? As a first approach to those questions, it is useful to observe how the United States responded to the 1973 embargo.

* Commenting on the success of the embargo "to stimulate political change toward the Arabs," Saudi Arabian petroleum minister Ahmad Zaki Yamani, who is often referred to in the West as an Arab "moderate," said in an interview with *Al-Akhbar*, Cairo, on March 14, 1974: "We pursue a policy of the 'stick and carrot' or more clearly a policy of 'threats and promises.'" As late as May 19, 1974, he said in an interview with the *Beyrouth Daily Star* that the embargo might be reimposed because "we have not yet realized our goals, our territories are still occupied by the Israelis, and the Palestinians are still dispersed in tents where they have been living for 25 years." Cited in *Le Monde*, May 21, 1974. It should be noted that Arab grievances so stated are not limited to territory occupied by Israel in the Six-Day War or the 1973 war.

II. U.S. RESPONSE TO THE 1973 EMBARGO

No play-by-play description of events during the six-month period will be attempted here. Instead, this section reviews the principal moves of the U.S. Government, industry, and the public.

At the beginning, a brief word may be said about precautionary policies, or the lack thereof, before the embargo arrived. There were no policies to cope with an interruption of a significant amount of imports of crude oil and products into the United States. While domestic oil consumption was growing rapidly, domestic crude oil production and exploration were permitted to decline and spare production capacity from existing wells to vanish by 1972. In contrast, Western European states have operated emergency stockage plans since the 1950s, principally by obligating oil companies to maintain stocks of petroleum products above certain minima (at their cost). The United States had no governmental stockage plan for the civilian economy, and maintained only ordinary commercial buffer stocks. Although the possibility of a disruption of Arab oil supplies had been aired for some time in public and intergovernmental discussions, e.g., in the Organization for Economic Cooperation and Development (OECD), and had been emphasized by threats from the Middle East as early as the spring of 1973, neither government nor industry took steps to provide for increased imports from alternative sources in such an emergency, and there was no exploration of embargo scenarios. All the initiatives to conclude assured oil supply agreements between the governments of the United States and Canada, Venezuela, Ecuador, Colombia, and even Saudi Arabia, which were advanced in years past by one side or the other, were permitted to founder. Without lengthening the list of maldispositions, it seems fair to say that the United States could hardly have been worse prepared, economically and politically, for the embargo in the fall of 1973.

The principal responses of the United States to the embargo, once it had been declared, will be discussed under four heads: (1) counter-embargo import policy; (2) consumer-country cooperation; (3) domestic supply enhancement; and (4) putting brakes on consumption.

LACK OF COUNTEREMBARGO IMPORT POLICY

When the embargo was announced, the *Wall Street Journal* reported that some New York oil experts doubted it could be made to stick. One of them was quoted as asking, "Do the Arabs expect the oil industry to police it?"* The answer that emerged in short order was that the Arabs did expect the oil companies to do so, that the companies generally complied, and that the U.S. Government did nothing to prevent them. That no doubt surprised some people, notably in Europe, who believe that the U.S.-based integrated oil companies are de facto agents of the U.S. Government, that they naturally favor the domestic U.S. market over other markets, and that the U.S. Government would hold them to such a role. Those beliefs proved to be illusory.

The stoppage of Arab oil shipments to the United States could not have been made to work without policing by the companies based in the United States or elsewhere. If they had directed tankers under their control, loaded with Arab oil, to U.S. or other embargoed destinations, Arab governments could not have stopped them. They could only have prevented the loading of further tankers for the companies and threatened the companies' assets. If verbal threats to this effect were made to the companies, they were not reported in the press;† in any event, there is no evidence that any company put them to a test. Some oil-swapping seems to have gone on at unboycotted ports of destination, and transfers

* *The Wall Street Journal*, October 22, 1973.

† Threats that were reported (stoppage of all exports, destruction of oil property, "a real disaster") were addressed to the U.S. Government in connection with alleged U.S. plans to land troops or to bring about a "consumer bloc for confrontation," and to European governments permitting a diversion of supplies. Mr. Yamani's reported threats were always government-directed and usually veiled. For instance, on November 6, *The New York Times* reported him as saying, "We are tracking down every last barrel of oil that reached the United States. . . . If any other European country tries to supply oil to the Netherlands, we will reduce our oil shipments to them in an equivalent amount." As he spoke, the report went on, "he tapped his finger on a folder that contained computer records on the destinations of all Saudi oil shipments, including refineries in Trinidad, Puerto Rico, and Canada that ship products to the United States." The most nightmarish threats were supplied at the time by Arab journalists or by the imagination of Westerners.

to intermediaries who then shipped to the United States, possibly even without the oil leaving the original tankers. But if agencies of the international companies were involved in these antiboycott activities, the companies failed to claim credit for them. For example, when U.S. Department of Commerce data were published in April, showing that some Saudi Arabian oil had arrived in this country in January and February, albeit in much-reduced quantities, Aramco partners Exxon, SOCAL, Mobil, and Texaco affirmed that they had not violated the embargo.*

In response to public criticism of the companies' role in the embargo--notably charges by Senator Henry M. Jackson that the prompt cutting off of Arab-origin supplies to U.S. military forces overseas was "a flagrant example of corporate disloyalty to the United States Government"--some of the companies explained their position. When asked whether Aramco "was more loyal to Saudi Arabia than to the United States," Chairman Liston Hills said, "That's not a fair statement. Aramco is operating in a sovereign country. The company had no choice. The government had a meeting, asked the Aramco management to come, and laid down the rules of the embargo."†

Aramco officials did not explain why the company's American parents, Exxon, SOCAL, Texaco, and Mobil, who distribute its oil, had to obey these rules, too. In any event, the parent companies said they did. The American company attitudes were not different from those of Europe-based majors. Mr. F. S. McFadzean, Chairman of Shell Transport and Trading, took the same position in an interview with a German newspaper.‡

**The New York Times*, April 13, 1974. FEO Administrator William E. Simon said in this connection that even Saudi oil arriving in February was apparently shipped prior to October 16, 1973.

†Statement made at a meeting of the World Affairs Council in Los Angeles, as reported in the *Los Angeles Times*, February 10, 1974. In the same vein, Mr. Joseph J. Johnson, a senior Vice-President of Aramco, told *The New York Times*, November 4, 1973, "All our operations are in Saudi Arabia. We have to follow the Saudi Government's orders or get out. It's that clear cut and getting out would do no one any good."

‡Question: To what extent do you have to follow the instructions of the Arabs regarding oil deliveries to certain countries [which provided for boycotting the Netherlands, one of Shell's home base

The position of the American companies can be explained by their primary concern with the protection of their assets. That concern may also explain why some company spokesmen criticized U.S. policies supporting Israel and called for more support for the Arab position in the Middle East conflict.* They thus attempted to stay on good terms with the Arab governments; at the same time, they escaped conflict with the U.S. Government, which did not order the companies to bring in the oil, embargo or not, or to give supply preference to the U.S. market. Given the absence of such an order, the companies must be absolved of Senator Jackson's charge of "disloyalty to the United States Government." They made it only apparent that preferential service to U.S. consumers is not their autonomous corporate objective. Moreover, the Government's price controls and the crude oil allocation program, which compelled importing companies to share supplies with others, seem to have provided disincentives for imports and induced some U.S. companies to supply European, Japanese, and Caribbean refineries, rather than domestic refineries, with available crude oil during the embargo.†

American and other international oil companies and traders did see to it that regular customers at embargoed destinations, notably the integrated companies' own refineries, did not run dry. By drawing on export expansions in several non-Arab countries, by shifting export destinations, and by oil swapping, they eased their customers'

countries]? *McFadzean*: We follow them fully and completely. We have no other choice. *Question*: If the Arabs should declare, no drop of oil for Norway . . .? *McFadzean*: We could do nothing but obey-- insofar as it concerns oil under such a ban. *Question*: Do the exporting countries check at the destination? *McFadzean*: A few of them do. But whether they check or not, we follow these instructions. *Die Welt*, January 8, 1974.

* It has been reported that on May 23, 1973, in Geneva, King Faisal of Saudi Arabia told representatives of the four Aramco partners that unless they brought pressure on the U.S. Government to change its Middle East policy, they could lose their Saudi oil concessions. On October 12, the presidents of the four companies reportedly submitted a memorandum to President Nixon counseling against military aid to Israel and pleading that both our economy and our security are at stake. Some of them published similar views in public statements at the time. See Jack Anderson's column in the *Washington Post*, July 19, 1974.

† *The New York Times*, February 22, 1974.

situation.* U.S. customers benefited from these activities, but apparently much less than did customers in other boycotted countries. Aggregate U.S. imports of crude oil declined from 3.6 to 2.4 million b/d, or by 33 percent, from the pre-embargo level (January through October 1973), during which time about 10 percent originated in Arab countries) to the last three months of the embargo period (January through March 1974). Aggregate crude imports in the boycotted Netherlands, two-thirds of which came from Arab countries in the first nine months of 1973, declined less. From October 1973 through March 1974 they were running at the same rate (2.1 million b/d) as in the pre-embargo period (January through September 1973). Only in the last four months of the embargo (December through March) did Dutch crude oil imports show a decline from that rate (to 1.8 million b/d, a 14 percent drop).† Oil swapping and diversion did much more to ease the burden for the Netherlands than for the United States.

It is not easy to explain how it came about that the U.S. Government did not pursue an import stimulation program during the embargo. Direct countermeasures, such as punitive measures against the embargoing governments (perhaps counterembargoes of U.S. exports to them) were discarded as unpromising. Those governments were not officially called hostile to the United States, or even specifically named in official statements. Administration officials from the President down avoided treating the embargo as an offense against the United States.‡ They

* In Table 1, note some of the import increases into the United States during the embargo period, particularly those from Iran and Indonesia.

† December was the month of lowest imports. From January through March 1974, Dutch imports were only 6 percent below the January-September 1973 rate. Data from Netherlands Economics Ministry, released April 11, 1974, and *Platt's Oilgram, Price Service*, January 24, 1974. Arab oil shipments to Rotterdam (directly) remained under embargo in April and May 1974, and at the time of writing the embargo had not yet been lifted by the principal countries of origin. But oil industry activity in that great European center appeared by then to have returned to normal.

‡ In the first major Presidential address on the energy situation following imposition of the embargo on November 7, 1973, the Arab action was referred to only in this language: "Unfortunately, our

rather presented it as an unfortunate event, to be lived with in the near term and to be taken into account for long-run dispositions.*

U.S. foreign policy during the embargo was directed toward persuading the Arabs that their boycott of the United States was unwarranted.

Reacting so meekly to a strike at its economic jugular is hardly a great power's typical response. Ignoring the practical offense and the accompanying humiliations by a cabal of small rulers would not necessarily have been the U.S. response under other circumstances, not even after the recent experience in Vietnam of an unrewarding display of great power against what appears in comparison a smaller offense. In the embargo situation, the United States faced a particularly awkward combination of economic, political, and strategic liabilities and constraints that militated against a more vigorous and direct response. Those constraints cannot be analyzed here fully, but three of them,

expectations for this winter have now been sharply altered by the recent conflict in the Middle East. Because of that war, most of the Middle Eastern oil producers have reduced overall production and cut off their shipments to the United States." *The New York Times*, November 8, 1973. The speech then led directly into supply deficiencies, and the need to save energy and to prepare for domestic supply expansion.

In a news conference on November 21, 1973, Secretary of State Kissinger dealt with the embargo in these terms: "Now the United States has full understanding for actions that may have been taken when the war was going on by which the parties and their friends attempted to demonstrate how seriously they took the situation. . . . Those countries who are engaging in economic pressures against the United States should consider whether it is appropriate to engage in such steps while peace negotiations are being prepared, and even more, while negotiations are being conducted. I should like to state for the United States Government that our course will not be influenced by such pressures. . . . However, it is clear that if pressures continue unreasonably and indefinitely, that then the United States will have to consider what countermeasures it may have to take. We would do this with enormous reluctance. . . ." *The New York Times*, November 22, 1973.

While U.S. officials consistently avoided calling the embargoing governments "enemies," the term was freely applied to the United States by Arab spokesmen.

* After the ending of the embargo, then Deputy FEO Administrator John C. Sawhill called "the bludgeon of embargo politics . . . a delicate blessing." Speech at the University of Maryland, April 16, 1974 (press release).

pertaining to relations with allies, alternative supply sources, and the rate of domestic oil consumption, will be briefly discussed in the subsections following.

A fourth and perhaps crucial one should also be mentioned here, the weakness of this country's position with regard to the Soviet Union in the 1973 Middle East context, and the urgent need to improve it. The factual alliance between Soviet efforts to gain a stronger grip on the Arab countries by championing and supporting their war on Israel, and efforts by Arab oil countries not necessarily beholden to the Soviets to reduce U.S. support to Israel through the embargo, could not be met successfully head on. It appeared more feasible to try to break up the alliance--best done by treating the Arabs as wayward friends, not enemies. Accordingly, as the October war drew to its end, the policy was set to mollify the most important embargoer, Saudi Arabia, by assuming a very active role as even-handed peacemaker, and to dislodge the USSR from its prominent position in Egypt, the Arab belligerent with the closest Saudi links. At the time of writing, that policy appears to have borne fruit, although the end of the affair is not yet in sight.*

Even granting that embargo restrictions had to be obeyed, the U.S. Government still could have instructed the home-based companies to give preference to U.S. consumers by diverting available foreign supplies from foreign to domestic destinations. That was not done, an omission in keeping with governmental attitudes and institutional arrangements that stem partly from times when U.S. international oil policy was less concerned with the protection of oil import supplies to the domestic civilian economy than with the interests of major U.S. companies

* As far as the embargo is concerned, the policy helped to make the Saudis and Egyptians favor ending it in the spring of 1974, when the Syrians, Libyans, and Algerians, egged on by the Russians, were trying to prolong it, and well before any satisfaction of maximalist demands, such as Saudi Arabia's for "the total liberation of Jerusalem," was in sight. It also may have helped earlier to make some Arab parties concede a partial resumption of oil supplies to U.S. military forces overseas, via oil company transactions and refinery activity overseas, after earlier efforts to cut off all Arab-origin oil to the forces. *The Washington Post*, March 21, 1974.

operating abroad and the supply interests of U.S. allies.* The "Voluntary Agreement System," established under the 1950 Defense Production Act, provides for a Petroleum Security Subcommittee of the companies to organize cooperative company action against supply shortages. The system was activated in the embargo crisis, but the Defense Production Act explicitly limits the system's operation to emergencies in which friendly foreign nations or U.S. military forces are deprived of supplies. Short of a declaration of national emergency, it therefore appears that the U.S. Government has no legal authority to use this government-industry mechanism for U.S. civilian supply purposes.†

In avoiding such directives to the companies, the U.S. Government took a position unique in its way. It appears that the British government at least sought to persuade the partly government-owned British Petroleum Company (BP) to give preference to the British market during the Arab restrictions. But BP reportedly refused to comply and the government did not pursue the matter. There is at least circumstantial evidence of a similar French government effort directed at companies operating in France to insulate the domestic market against any impact

* A review of the State Department's involvement in international oil issues, published by the Comptroller General in January 1974, provided the following background description: "Although the U.S. Government is responsible for protecting American oil companies' rights and properties overseas, . . . [it] does not have any formal commitments from these companies to ship oil to the United States, even in emergencies. Department of State officials indicated that U.S. firms are obligated to honor existing supply contracts with foreign purchasers and stated that, if the U.S. Government ever overrode the companies' contractual obligations, it should be prepared to see refinery and other facilities abroad adversely affected and U.S. relations with its allies seriously jeopardized." Comptroller General of the United States, *Issues Related to Foreign Sources of Oil for the United States*, Washington, D.C., January 23, 1974, p. 21. The report went on to describe an Aramco offer to the Government during World War II of preferential supplies to the United States, the Government's acceptance, and the company's withdrawal of the offer before conclusion of the arrangements. Pp. 27-28.

† National Petroleum Council, *Emergency Preparedness for Interruption of Petroleum Imports into the United States, Supplemental Papers to Interim Report of November 15, 1973*, Washington, D.C., December 21, 1973, pp. 98ff.

of the Arab restrictions and thus to implement the preferential treatment which the Arabs had proffered to France. There is no evidence that the effort was fully effective, however. One may therefore conjecture that a similar U.S. effort in that direction would have been equally ineffectual without the application of pressure so powerful as to wreak more diplomatic damage than economic gain.

The course that the U.S.-based major oil companies followed during the embargo must be seen in conjunction with that of the U.S. Government. One cannot easily deny the observation of a leading student of international oil that "the oil-producing affiliates of the international oil companies have become completely subservient to the directives issued by the oil-producing countries."* But he seems to be expressing only a half-truth when he goes on to say that the companies "had no choice last fall but to become the instruments for carrying out the embargo on oil shipments to their own home countries." The other half of the truth is that neither the companies nor the governments involved were prepared to act--notably, to combine to act--to face down the blackmailers and take the risks required to stave off capitulation.

In sum, neither company nor government priorities allowed for a vigorous counterembargo import policy to the benefit of the United States. It should be noted in contrast, however, that those priorities favored and sustained a vigorous counterembargo import performance for the benefit of the Netherlands and other European countries depending on oil supplies through the Netherlands. What companies and oil traders did to keep oil flowing into Rotterdam put in the shadow all efforts aimed at intergovernmental oil apportionment during the Arab embargo.

"CONSUMER COUNTRY COOPERATION"

The embargo, and the accompanying restrictions of Arab oil output and exports generally, arrived in the midst of protracted consultations among the U.S. and the Western European, Canadian, and Japanese governments. The consultations were conducted largely in the OECD, and dealt

*Walter Levy, "World Oil Cooperation or International Chaos," *Foreign Affairs*, July 1974, p. 693.

with mutual aid in supply emergencies and other forms of cooperation on energy matters. Western Europe had adopted an emergency import sharing plan in the 1956 Suez crisis. Since that time, an OEEC (now OECD) Oil Committee had been responsible for initiating, when warranted, the proclamation of a supply emergency by the OECD Council, and then for allocating among the member states--through the agency of an Industry Advisory Board of the large oil companies--90 percent of the oil moving by sea into the West European area on the basis of past consumption, leaving 10 percent for special requirements. OECD had reactivated this arrangement briefly at the time of the Six-Day War of 1967. In late 1972, U.S. interest in joining that emergency oil apportionment scheme, thus making the plan OECD-wide, had become manifest. The OECD has wrangled ever since over how to fit so large an oil producer as the United States into a scheme designed for oil have-nots. Should imports or total national supplies be shared? Would the United States commit itself to compulsory emergency stocks and to consumer rationing as the Europeans had done? Should the principal international oil companies be called upon to allocate supplies? The issues were far from resolved in October 1973, and agreement is still not in sight.

U.S. pressure for organizing consumer cooperation on supply apportionment increased with the embargo. But that had nothing to do with improving the U.S. supply situation under the embargo. If the United States had participated in such a sharing plan, and if the plan had been invoked during the embargo (as things went, the OECD Council never chose to declare a supply emergency), reapportionment oil would in all likelihood not have flowed westward but eastward across the Atlantic, at least in a statistical sense. For even after having lost its reserve supply capacity, with which it could help Europe in the 1950s and early 1960s, the United States was still relying on supplies originating in Arab countries for only about 10 percent of its total oil consumption; the similar figure for Western Europe as a whole was better than 80 percent.* Moreover, the Arabs saw to it that Western

* Authors' estimates of the situation before the onset of the embargo, covering in the case of the United States all OAPEC oil reaching U.S. destinations in crude or refined form, directly or through foreign processors.

Europe was not flush with oil while they boycotted the United States. Most of the Arab producers curtailed overall oil output during the embargo and discriminated against the European countries they deemed "hostile" (Netherlands) or "neutral" (Germany and others). European governments were far from eager to share supplies with the United States; as it was, they were not even prepared, as governments, to endorse sharing with the Netherlands, a European Community member, for fear of Arab reprisals.

U.S. pressure for consumer country cooperation resulted from foreign and institutional policy, not national oil supply considerations. On the one hand, the concept of "consumer country cooperation" appeared a useful means to activate, in the context of the oil crisis, the U.S. alliance relationships with Western Europe and Japan and to restore a diplomatic discipline in this frame--not only vis-à-vis the Arab countries but also the Soviet Union--which had been badly frayed. On the other hand, such intergovernmental cooperation offered a means to buttress the international oil companies in their effort to resist "nationalization" of their business in certain producing and consuming countries, in particular to establish a "code of conduct" that would keep "consumer" governments (France, Britain, Germany, Japan, etc.) and their chosen-instrument companies from pushing the traditional major market-regulating companies aside through bilateral deals with producer governments, especially barter deals. In a speech in London, December 1973, Secretary of State Kissinger proposed an "Energy Action Group of senior and prestigious individuals" to define broad principles of cooperation and to initiate some specific measures;^{*} and on January 10, 1974, the President called the consumer governments together for an Energy Conference in Washington.[†]

We need not discuss here the very mixed responses to these proposals in Europe and Japan and the strenuous French opposition to them. The Energy Conference met. The U.S. Government declared itself ready

^{*} Address to the Pilgrims of Great Britain, December 12, 1973, *Department of State Bulletin*, December 31, 1973, p. 781.

[†] *The New York Times*, January 11, 1974.

"to share in times of emergency . . . an agreed portion of our total petroleum supply provided other consuming countries with indigenous production do likewise."^{*} Over French dissent, the other participants agreed on "the need for a comprehensive action program" and the establishment of a "coordinating group headed by senior officials" to form working groups and prepare for a conference of producer and consumer governments.[†] But the communiqué made no mention of the "code of conduct" Secretary Kissinger had called for in his opening statement; and the absence of an understanding on this point became manifest in the European Community invitation to the Arab states to engage in broad political and economic consultations (without the United States) which was announced from Brussels on March 4 and which caused an angry U.S. reaction.[‡]

The Arab oil embargo of the United States and most of the accompanying production curtailments ended shortly thereafter, but it seems fair to say that the consultations and contretemps among the consumer country governments had very little to do with the embargo's course and ending. It remains to be seen what will emerge from the coordinating group formed after the Washington conference with regard to future emergency 'supply sharing'^{**} and whether the multilateral consumer-producer

^{*} Opening statement by Secretary Kissinger on February 11, 1974, *Department of State Bulletin*, March 4, 1974, p. 204. Such other consuming countries might have been Canada, Australia, Norway, and the United Kingdom.

[†] Communiqué, *ibid.*, pp. 221-222. In the ensuing acrimonious exchanges among the Europeans over the breach of what had appeared to be their "common front" prior to the conference, French Foreign Minister Michel Jobert elaborated on France's wish to respect the desire of producing countries to dispense with the "international capitalistic companies" in selling their oil to other states. *Le Monde*, February 16, 1974.

[‡] *The New York Times*, March 5, 1974.

^{**} It appears that the search in the Energy Coordinating Group for an integrated emergency program has veered away from the idea of apportioning import supplies among the participating countries in emergencies, and toward country commitments to a complex scheme of stockpiling, conservation, and rationing measures. It remains to be seen what commitments governments will actually make and how these commitments would be harmonized, in the case of the European OECD members, with their prior commitments to supply sharing.

conferences conceived at Washington or Brussels will ever materialize. In the post-embargo situation, U.S. views on a desirable "code of conduct" may well change as state-to-state oil supply contracts and barter deals become less attractive. The United States may then begin to emulate the Europeans and Japanese in seeking broad state-to-state economic cooperation deals with individual producer countries, in particular Saudi Arabia, bilateral "joint commissions," and other non-multilateral vehicles, which may or may not involve specific country-to-country supply commitments.

The utility of "consumer government cooperation" for safeguarding the flow of oil imports to the United States in emergencies was certainly not demonstrated and should not be presumed for the future. On the contrary, such cooperation under the present scheme of things is more likely to lead to U.S. safeguarding of European imports. The actual measures taken during the crisis by the various "consumer" governments regarding supplies flowing from their jurisdictions to other countries seemed to be pointing toward the day when the United States would be lending supply assistance to the Europeans, not the other way around. By implication, that assistance would have gone not only to the Netherlands but to all West European countries, owing to the non-invocation of preferential treatment of the U.S. market by U.S.-based companies. One may judge somewhat more positively the utility of the concept for U.S. alliances and the position of the international oil companies, but such speculation falls outside the range of this study.

PUTTING BRAKES ON DOMESTIC CONSUMPTION

Given the almost total short-run inelasticity of domestic energy supply prevailing in the United States in 1973, an embargo designed to hurt the U.S. oil consumers (and thus to produce political effects) promised to reach its objective. Given the policy-imposed constraints on import substitution during the Arab embargo, which we have reviewed above, an embargo lasting for several months was bound to reduce domestic consumption--practically the only way left to cope with the embargo. The question was only how the reduction would be "administered."

Americans took the challenge with some ambivalence. On the one

hand, they had long boasted of cheap and plentiful energy as a national asset, a prime requisite of productivity and well-being that was presumably worth defending. They took pride, however unwisely, in the fact that their per capita consumption of energy was more than double that of Western Europe and Japan, and more than ten times that of the rest of the world. On the other hand, particularly to the increasingly conservation-minded elite, that high consumption level, increasingly dependent on imports that could be cut off, amounted to an extravagant folly that deserved to be restrained.

The truth lay on both sides, of course. High energy consumption meant convenient and flexible motor transportation, but also the heavy, fuel-guzzling cars Detroit had chosen to produce, and traffic jams. It meant cheap fuel for homes and industries, as well as overheating and fuel wastage through poor insulation; air-conditioning where it was needed and where it was a fad; electric kitchens and office machinery as well as orgies of neon light and electric toothbrushes. It meant opportunities for using energy to protect the environment, and yet furnished an excuse for opposing concrete measures of environmental protection.

The question was where the axe should fall if consumption had to be restrained. Citizens, companies, agencies had their own interpretations of "necessities" and "luxuries," and public officials listened and brought in their own preferences (e.g., at the federal level, priorities for industrial output and employment, and home heating in winter) once the embargo and the chosen foreign policy made consumption cuts unavoidable.

Governmental philosophy was shifting from self-satisfaction to uneasiness about high energy consumption when the embargo struck. President Nixon's first energy message to Congress in June 1971 had dwelt on the need for "cleaner energy" and was silent on consumption. His second message, on April 25, 1973, brought up energy conservation, expressed the need to develop a "national energy conservation ethic," soft-pedaled the environmental emphasis, and stressed a need for increasing domestic supply (and import facilitation). But it still observed, without apology, that "as America has become more prosperous

and more heavily industrialized, our demands for energy have soared. Today, with six percent of the world's population, we consume almost a third of all the energy used in the world;" and it expressed President Nixon's distaste for "compulsory means" and "energy rationing."^{*}

In October, action could no longer be avoided. In his first energy address during the embargo period, President Nixon announced that "we as a nation must set upon a new course. In the short run, this course means that we must use less energy--that means less heat, less electricity, less gasoline."[†] And near the end of the embargo, Federal Energy Administrator William E. Simon said, "we must establish a permanent 'conservation ethic.' We have been too extravagant in our energy consumption patterns. . . . The recent embargo has forced us to reduce this consumption now, but even more important, we must be sure that an attitude of conservation becomes a permanent part of our lives."[‡]

Besides admonishing industrial and household users to become more careful energy consumers, and seeing to it that the governmental bureaucracy cut down its own consumption, the government had two ways for administering parsimony: through the market (i.e., higher energy prices) and through quantitative regulation. Not well prepared for either course, it followed both, hesitantly and awkwardly. The policy of rationing by price was constrained by counterinflationary and otherwise inspired price controls that held down wellhead prices for interstate natural gas and "old" (production level) domestic crude oil, while prices for "new" domestic crude and imported crude as well as oil product prices generally were permitted to rise substantially. Consumption control by regulation took the form of various allocation programs, for crude oil to refineries, for distillate and residual fuel oil, diesel fuel, jet fuel, kerosene, butane, propane, and gasoline to major

^{*}President Nixon's Energy Message to Congress, press release, April 25, 1973.

[†]President Nixon's broadcast address, November 7, 1973. *The New York Times*, November 8, 1973.

[‡]Mr. Simon's statement before House Appropriations Subcommittee, March 20, 1974, press release.

industrial users, wholesalers, and retailers. Formal consumer rationing, however, was shunned, notably for gasoline. The programs were improvised and worked with variable consistency, equity, and effectiveness. They were accompanied by circumstantial consumption restraints, mandatory (with or without appropriate legislation, on which agreement was often hard to come by), or voluntary, i.e., through reliance on moral suasion and imitation. Such restraints included a year-round extension of daylight saving time, adoption of lower speed limits (55 miles an hour became the general norm), prohibitions of display and ornamental lighting, prohibition of retail gasoline sales on weekends in many places, and so forth. These circumstantial restraints served to propagate the idea of energy-saving by affecting community standards and especially by creating inconveniences for energy users (such as forcing them to queue up at gasoline stations where both supply and service were limited).

It is not our task to pass judgment here on the economic and social effects of the consumption control efforts, as a whole or singly. During the embargo electricity and oil consumption were knocked off their steeply rising curves and even reduced below their pre-embargo levels. Preliminary Rand studies found that national electricity consumption during the embargo winter (November through March) ran about 7 percent below the level to be expected from previous growth experience (and about at the level of the preceding winter); gasoline consumption ran about 4.5 percent below the growth-adjusted level (and about 1 percent below the preceding winter); and distillate fuel oil consumption ran about 14.5 percent below the growth-adjusted level (and 8 percent below the preceding winter, which had been about 7 percent colder in the critical New England and Middle Atlantic regions). Natural gas consumption decreased, too, on both counts, but no more than could have been expected from the relatively warm weather of the embargo winter.* Aside from those indicators of quantitative success, one should observe that the vagaries of some of the control efforts wrought all kinds of

*Based on S. H. Dole and D. J. Dugas, *A Brief Summary of Recent Energy Savings*, May 1974, unpublished manuscript.

social and political effects and probably did not earn government a community judgment of "a job well done." Their side effects on the market structure (e.g., a sharp reduction in numbers of the small independent gasoline stations), income distribution, and fiscal equity caused considerable social strains and some unrest. Still, the policies did not lead to a breakdown of public order during the crisis months. By these minimum standards, it may well be claimed that the policies "worked." It may also be claimed that the crisis was mild and short enough to permit the policies to work without a real upheaval.

Two big questions remain: (1) whether and how the country will adopt the "permanent conservation ethic" Mr. Simon asked for, and (2) what lessons will be drawn from this consumption control experience for the management of a future supply emergency. The answers to both questions are wide open. A resurgence of consumption could have been expected after the embargo was over, direct controls were relaxed, and oil product price increases lost some of their specific bite in the general onrush of inflation. But at the time of writing, such a rebound has not happened yet, perhaps because of higher energy prices and the recent economic decline. It is conceivable that a continued easing of the oil supply situation will restore a good part of the up-drift of consumption and make admonitions to parsimony fall on deaf ears. Some of the energy-saving processes that have been set in motion will of course continue, because they pay, or because they meet people's tastes, or for other reasons; but their impact on the aggregate consumption picture is unpredictable considering the multiplicity of other influences that will come to play on it.

As for the future applicability of the specific embargo-time consumption control policies, their effects remain to be analyzed. Some of the policies (daylight saving time in winter, the speed limit reduction) may have done little to conserve energy; others (such as the inducements to electricity saving and the obstacles put in the way of gasoline purchases) may have done a good deal more. Still others (such as the encouragement of public ground transportation and the enhancement of energy-use awareness in industry and households) may have important long-range effects in spite of only small immediate effects.

Both the efficiency and the equity of the 1973-1974 control policies will be evaluated differently by different schools of thought and leadership groups, and their role as useful precedents or abhorrent examples in future emergencies will depend a good deal on the configuration of political leadership in the country at that time. In particular, it remains to be seen whether discontent with the experienced consumption restrictions will be translated into more effective measures to safeguard a steady flow of domestic and import supplies.

PROJECTING DOMESTIC SUPPLY EXPANSION: "PROJECT INDEPENDENCE"

Considering that the energy supply squeeze, evident since early 1973, had set the governments of all industrial countries to looking around for ways to lessen their dependence on oil imports and enlarge domestic energy supplies, it was hardly surprising that the U.S. Government should look with alarm at the stagnation of its mighty domestic supply base. President Nixon's energy message in April 1973 pointed to numerous things that needed to be done about coal, Alaskan and off-shore oil, shale, nuclear energy, and the like. Its approach was more philosophical and admonitory, notably toward the Congress, than economically specific and politically practical, but it gave a much needed signal.

The embargo furnished an occasion to dramatize this effort and to set a few things in motion. On November 7, a Presidential broadcast address proclaimed "Project Independence." It recalled the Manhattan and Apollo Projects and proposed that, in the spirit of those efforts, "by the end of this decade we will have developed the potential to meet our own energy needs without depending on any foreign energy sources."* There was clearly no hope that anything flowing from this proposal would give relief during the winter months ahead. The President's near-term concerns were energy-saving and Watergate, between which the words on Project Independence were sandwiched. The Project was a long-run proposition, to come to fruition in 1980.

* President Nixon's broadcast address of November 7, 1973, *The New York Times*, November 8, 1973.

But if that date was to have any meaning, the long-run proposition had to be attended to very quickly. With coal-mine digging, nuclear power plant construction, pipeline laying, offshore drilling, and oil shale exploitation ready to begin in 1974; with manpower, transportation equipment, and new technologies readily available; with corporate and governmental funds appropriated and a variety of enabling legislation passed, the great expansion might have gotten under way in time to meet the 1980 target. It scarcely moved an inch. The nearest thing to a leap forward was the beginning of construction of the Alaskan pipeline in the spring of 1974. Plans and materials were in place; the project had been waiting only for final legislative action, which it obtained in November 1973. For most of the other endeavors, some or all of the prerequisites for an early start were lacking. Assembling them will take a good deal of time. Bottlenecks abound--material, equipment, manpower, technological, financial, managerial, and legislative--that are likely to delay many projects. In October 1974, the gradual decline in U.S. crude petroleum production had not yet been arrested.

An early explication of the targets of Project Independence, made by the Federal Energy Office in early 1974,* envisaged 1980 domestic production levels as the following percentages of 1973 production: oil, 128 percent; natural gas, 118 percent; coal, 159 percent; nuclear power, 1300 percent. Together with contributions of shale oil extraction and hydro and geothermal power, these expansions would yield the equivalent of about 42 million b/d of oil instead of the 30 million b/d produced in 1973, or 38 percent more than in that year. And provided that consumption would proceed at a growth rate of two percent per year (instead of the five to seven percent of the recent past), the augmented domestic supply would obviate net imports by 1980 (in 1973, they still were six million b/d). By 1985, continued developments along these lines would even suggest a net U.S. export capacity of 3 million b/d.

* A summary appeared in the *Oil and Gas Journal*, March 4, 1974. This was an early attempt to give precision to the targets of Project Independence. Further attempts are under way in the now established Federal Energy Administration.

That picture of the future met with a great deal of incredulity among specialists. A Shell Oil Company assessment, for example, said that the United States "won't be even near energy independence until 1990," and that making even that deadline would require a "fantastic effort" in production increases and demand restrictions.* Skepticism about the composite projection as specified above certainly seems warranted, particularly because one may doubt that a "fantastic" effort will be made. The companies have already launched a good many expansion projects (beginning notably with efforts to extract more oil from existing domestic fields), but their continued progress and the launching of others on the required scale and in time is not yet certain, and meanwhile the downward drift of output continues. The effort is not solely a question of mobilizing resources, although the financial, technological, and material requirements will strain national capabilities. It is above all a question of political and corporate will, organization, and follow-through. One cannot be sure that government will impress companies with the necessity to proceed to greater domestic output, provide incentives that work and are compatible with fiscal equity, and promote an economic environment in which the material and human resources needed for expansion can be obtained. Nor can one be sure that current high company profits will find their way into effective domestic energy expansion of the projected scope. The prospect, perhaps the mirage, of a "world oil surplus" by 1980 that some people already envision on the basis of the presumed success of Project Independence, may induce companies and government to proceed cautiously with domestic expansion projects that might be vulnerable to the competition of "cheap" imported oil.† The great output increases of which

* Cited in *Oil and Gas Journal*, February 25, 1974.

† The recent Ford energy study depicts the possibility of an oil glut by 1980, assuming among other things a U.S. oil import demand of 2 to 3 million b/d by that year. In that picture, the presumed "production maximizers" among the oil-producing countries (including Iran, Iraq, Indonesia, Nigeria, Venezuela, Algeria, and others) are said to be capable in 1980 and 1985 of meeting the import requirements of the non-Communist world, without any contribution from Saudi Arabia and the remaining Arab countries, which are classed as "conservers" or "residual suppliers." (As yet unpublished manuscript.)

Saudi Arabia and some other Middle East countries are technically capable may not materialize in the years ahead, but fascination with that possibility could do a great deal to deter wary companies from costly domestic projects. One of the largest U.S.-based purveyors of Saudi oil foresees aggregate U.S. imports of 10 million b/d by 1980, consisting in large measure of Saudi oil.

The present study considers possible a fair amount of progress along the lines of Project Independence and argues that developments on the demand side may be more favorable to the realization of low import levels by 1985 than is often assumed. But even on this relatively optimistic basis--optimistic on the side of domestic production and consumption restraint--we shall come to conclude that in the near term, i.e., the remaining years of this decade, U.S. oil imports from politically insecure sources will tend to be large, in some years probably larger than they were in 1973. If the country does get moving on the path of restoring a capacity for oil self-sufficiency at a moderately growing pace of consumption--that is, without economically and socially damaging recurrences of shortages--the early stretches of that path may nevertheless find the country in high import dependence. That is what matters for the study of U.S. supply protection.

Generally speaking, Project Independence is probably the most valuable and farsighted response of the United States to the embargo of 1973. It holds out greater promise than does reliance on consumption curtailment during emergencies, or reliance on "consumer country cooperation," to free the country's energy economy and its position as a great power from dependence on a "producer cartel" whose play may well produce recurrences of quantity-price squeeze plays, worldwide and on the United States in particular. Although the effort to bring the project to fruition is fraught with pitfalls and dangers, from wrong incentives to environmental damage, and although it bears costs that must be regarded as great albeit incalculable, the country has probably less to fear from the project "succeeding too much" than from its remaining an elusive will-o'-the-wisp with long lead times.

Leaving now the discussion of U.S. responses to the 1973 embargo, we turn to a review of U.S. oil import experiences, 1955 to 1973 (Sec. III) and thereafter examine the outlook for future U.S. imports (Sec. IV).

III. U.S. PETROLEUM IMPORTS, 1955-1973

Twenty-five years ago, the United States was still self-sufficient in petroleum. Although crude oil and petroleum products were imported into the United States before 1948, imports were balanced by substantial exports of crude oil and petroleum products. By 1955, net imports had grown to 10 percent of total consumption, as domestic production could not compete with the less expensive foreign crude in meeting the growth in domestic demand. In the eighteen years since 1955, net imports have grown to 36 percent of domestic demand. This section describes the changes that occurred in the level and composition of U.S. petroleum imports during that period as they were affected by import policies. Since gross exports of crude oil and petroleum products from the United States have stabilized at 60 to 90 million barrels per year since 1958 (excepting 1967, when the Suez Canal was closed), they will be excluded from the description, the focus of which will be gross imports.

OVERALL IMPORTS

The period begins with the first major official expressions of concern over a growing level of oil imports and ends with the year of the Arab oil embargo. Table 2 and Fig. 1 summarize the changes in imports of crude oil^{*} and petroleum products during this period within the context of the total supply of petroleum to the United States.[†] From 1955 to 1970 imports of both crude oil and petroleum products

^{*}In this discussion, crude oil will include plant condensate and unfinished oils. The distinction used is thus one between petroleum requiring further processing in the United States and petroleum ready for consumption. Some sources include plant condensate and unfinished oils with petroleum products, the distinction in that case being between petroleum that has undergone some refining and petroleum that has not.

[†]The sources of the data used in these and subsequent tables and figures are discussed in Appendix B. A detailed table of imports by type and source can be found in Appendix C.

Table 2

U.S. PETROLEUM PRODUCTION AND IMPORTS, 1950-1973
(In million barrels)

Item	1950	1955	1960	1965	1970	1973
Domestic crude oil and lease condensate production	1973.6	2484.4	2574.9	2848.5	3517.5	3353.4
Domestic natural gas plant liquids production	204.7	261.2	340.2	441.6	605.9	634.4
Crude oil imports	181.4	297.9	392.0	485.7	522.6	1271.6
Petroleum product imports	125.4	165.6	276.0	415.0	724.8	991.9
Total	2485.1	3209.1	3583.1	4190.8	5370.8	6251.3

SOURCE: U.S. Bureau of Mines. (See App. B.)

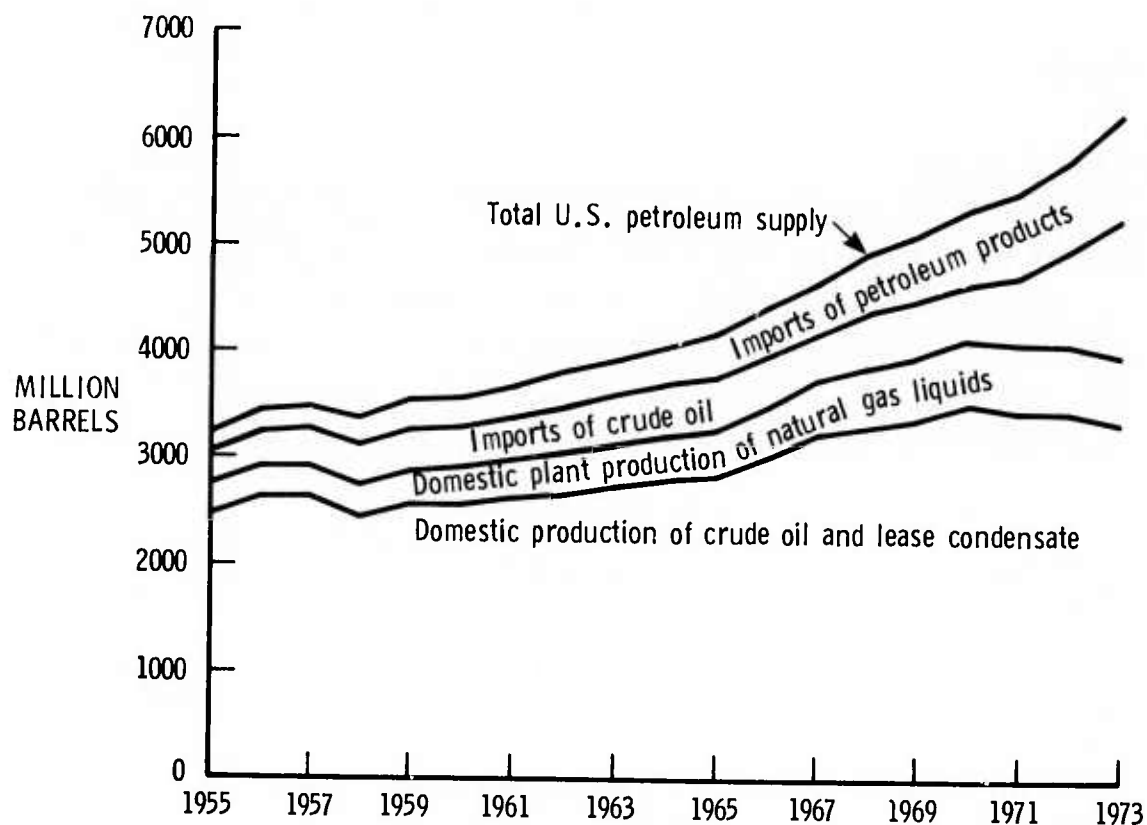


Fig. 1--U.S. petroleum supply by source, 1955-1973

grew steadily but slowly. Since domestic petroleum production was also growing steadily during this period, the overall share of imports did not noticeably increase, remaining around 20 percent of the total petroleum supply from 1958 to 1970. The share of crude imports actually declined modestly while petroleum product imports took over a steadily increasing share of the U.S. market.

Since 1970, this situation has dramatically changed. After twelve years of continuous increases, domestic production began to decline. Domestic demand continued to grow by more than five percent annually. The result was an explosive growth in imports--particularly imports of crude oil, which grew by 143 percent to double its share of the U.S. market in three years. By 1973 petroleum imports provided more than 36 percent of U.S. petroleum supply.

Throughout this period up to 1973, the level of petroleum imports into the United States was controlled. The first oil import programs, originated in 1955 and 1957, were voluntary and soon broke down because of noncompliance by some companies. The problems were occasioned by the increase in the number of companies applying for imports, and the lack of any limitations on petroleum products and unfinished oils.* The continuing necessity to provide economic protection to domestic petroleum production ultimately gave rise to the Mandatory Oil Import Program in 1959. Under the Mandatory Program, imports of crude oil, unfinished oils, and petroleum products (except for residual fuel oil) into Districts I-IV (the states east of the Rockies) were initially limited to 9 percent of total demand in those districts. Imports into District V (the West Coast) were limited to the difference between estimated domestic demand and domestic production in that district. The Secretary of the Interior was to determine imports into all districts of residual fuel oil to be used as fuel. In 1963, the crude-products quota for Districts I-IV was revised to 12.2 percent of estimated domestic production in those districts. In 1966 imports to District I (the East Coast) of residual fuel oil to be used as fuel

*Kenneth W. Dam, "Implementation of Import Quotas: The Case of Oil," *Journal of Law and Economics*, Vol. 14, No. 1, April 1971, pp. 5-14.

were effectively freed from import controls. In 1970, the 12.2 percent quota for Districts I-IV was increased by 100,000 b/d. Another 100,000 b/d increase was allowed in 1971, and another beginning in 1972. In May 1972, a further increment of 230,000 b/d was added to the 1972 quotas. In September, a further 42,000 b/d increment was granted, together with permission to importers to borrow up to 10 percent of their 1973 quota. For 1973, the level for Districts I-IV was set at 2,700,000 b/d, an increase of 915,000 b/d over 1972 levels. In April, the Mandatory Oil Import Program was suspended and replaced by a license fee system.*

Those developments were closely related to changes in domestic production, particularly in the two largest producing states, Texas and Louisiana, where oil production had been controlled since the 1930s to maintain prices. Under the protection of the Mandatory Program, production was permitted to increase steadily, rising from 1254 million barrels of crude oil and lease condensate in 1958 to 2156 million barrels in 1970. By 1972, according to some calculations, excess production capacity in the two states was reduced to nothing. Both permitted production at 100 percent of allowable rates. But production in Louisiana peaked in 1971 and declined over 10 percent in the following two years. Texas production peaked in 1972 and declined modestly in 1973. Since those two states dominated U.S. production (over 60 percent), only imports remained to take up the slack.

Until 1971, the Mandatory Oil Import Program proved to be a considerable success in restricting crude oil imports (Fig. 2). Crude oil imports increased by less than 40 percent, from 380 million barrels in 1958 to 523 million in 1970. Once domestic production began to decline, the program proved to be unmanageable, with crude oil imports soaring to 1272 million barrels in 1973. Petroleum product imports, consisting primarily of the less tightly regulated residual

* Cabinet Task Force on Oil Import Control, *The Oil Import Question*, Washington, D.C., February 1970; and Permanent Subcommittee on Investigations of the Committee on Government Operations, United States Senate, *Staff Study of the Oversight and Efficiency of Executive Agencies with Respect to the Petroleum Industry Especially as it Relates to Recent Fuel Shortages*, Washington, D.C., November 1973.

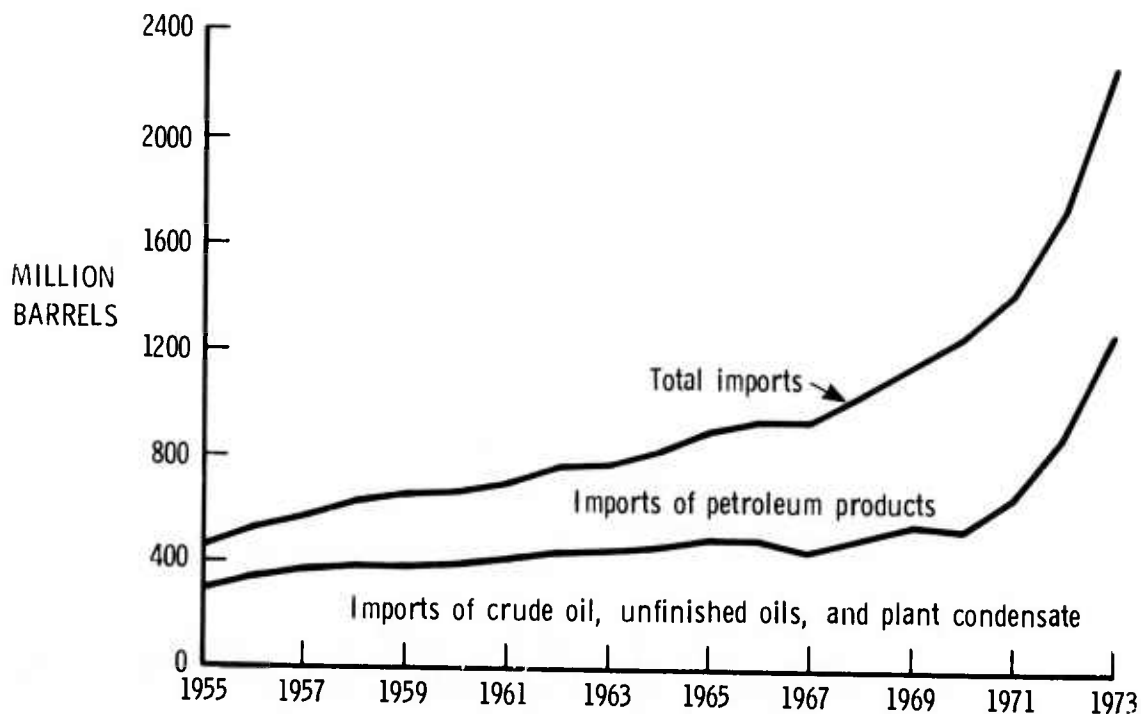


Fig. 2--Petroleum imports into the United States by type, 1955-1973

fuel oil, grew at an accelerating rate throughout the period of the program, from 256 million barrels in 1958 to 725 million in 1970, increasing their share of total imports from 40 percent to 58 percent. Since 1970, product imports have grown only 37 percent, declining to 44 percent of total imports.

IMPORTS BY AREAS AND COUNTRIES OF ORIGIN

During the Mandatory Oil Import Program, the immediate sources* of petroleum imports by hemisphere did not change substantially (Fig. 3). Imports from the Western Hemisphere grew at a steady rate

* Because of the characteristics of official import statistics, most of the subsequent discussion of imports by source will be limited to immediate (direct) sources. The immediate source of crude oil imports (excepting unfinished oils) is also the ultimate source. Imports of petroleum products and unfinished oils from Europe and the Caribbean (Bahamas, Netherlands Antilles, Puerto Rico, the Virgin Islands, and to some extent Trinidad) originated in Venezuela, Africa, or the Middle East.

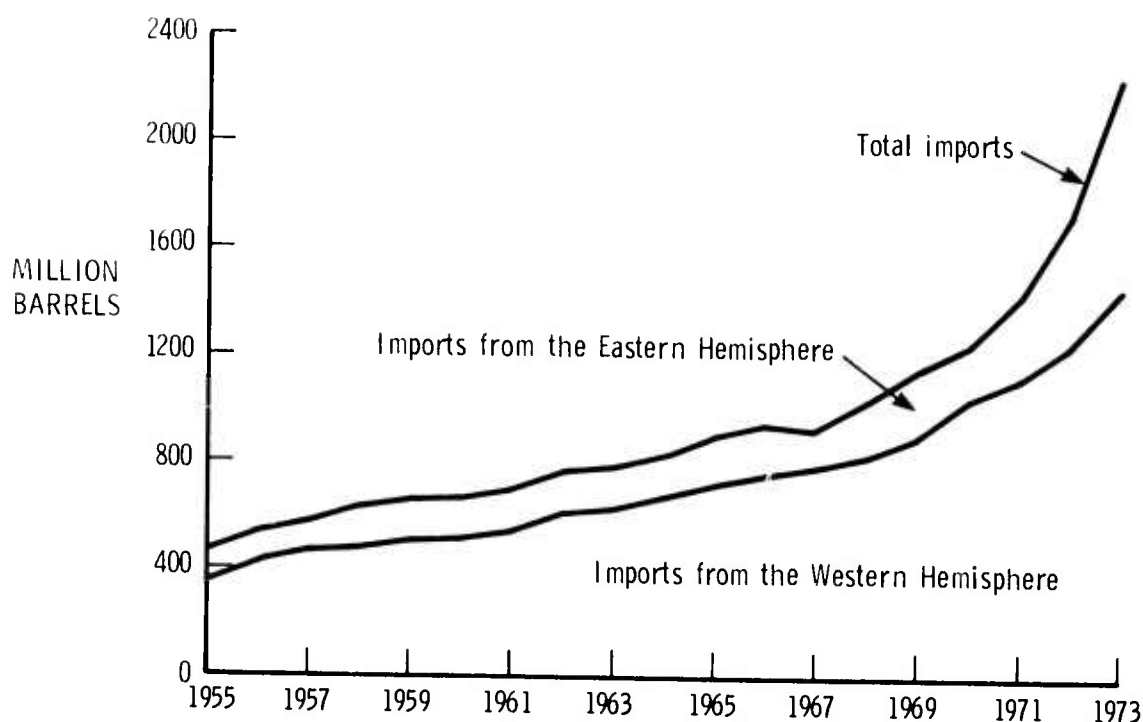


Fig. 3--Total petroleum imports by hemispheric source, 1955-1973

throughout the period, remaining around 80 percent of total imports through 1971. But when total imports began their rapid increase after 1970, Western Hemisphere sources could no longer keep pace; the direct share of the Eastern Hemisphere grew to 36 percent by 1973. Directly and indirectly, the Eastern Hemisphere accounted for around 45 percent of total U.S. imports in 1973.

Two other general distinctions are relevant to a discussion of U.S. imports, that between nonmembers and members of the Organization of Petroleum Exporting Countries (OPEC) and that between nonmembers and members of the Organization of Arab Petroleum Exporting Countries (OAPEC). Figure 4 indicates the trends in OPEC and non-OPEC imports between 1955 and 1973. Prior to 1970, direct imports from the OPEC member countries^{*}--Algeria, Ecuador, Gabon, Indonesia, Iran, Iraq,

^{*}For purposes of analysis, OPEC and OAPEC members throughout this period are considered to be the same as current membership, even though both organizations began during this period and have increased in membership during that time.

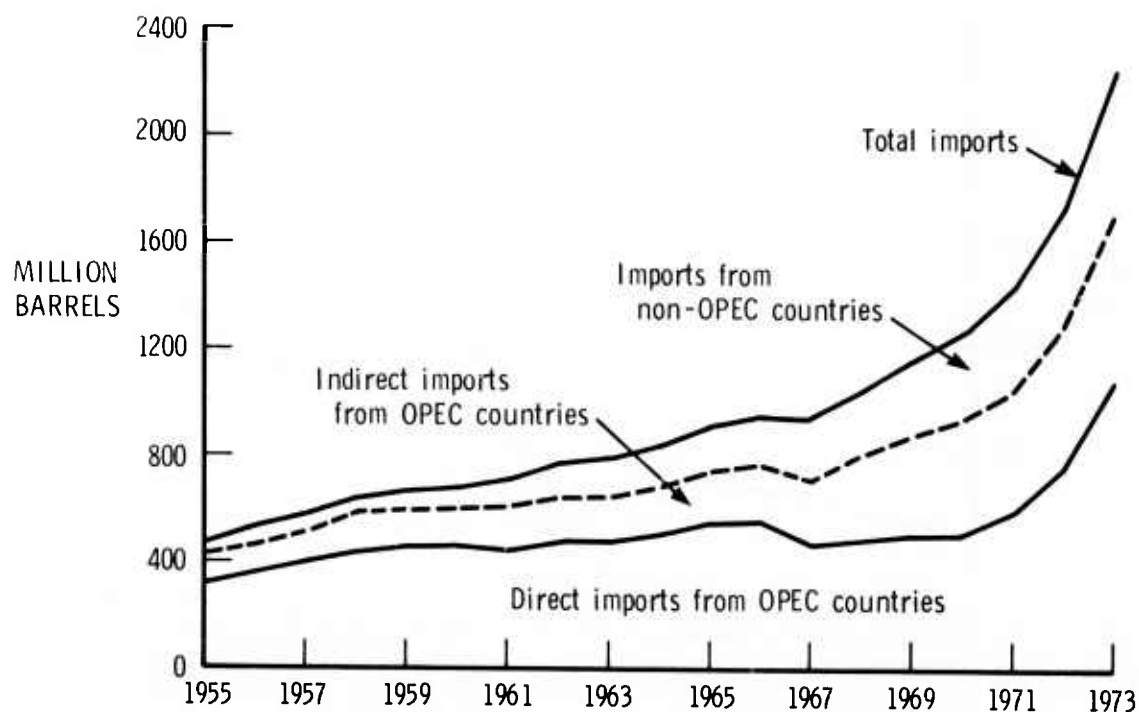


Fig. 4--Total petroleum imports by source, OPEC and non-OPEC, 1955-1973

Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, the United Arab Emirates, and Venezuela--grew very slowly (only 16 percent from 1958 to 1970). In the three years since then they have more than doubled, from 493 to 1076 million barrels. Indirect imports from OPEC (basically products refined from OPEC crude in Europe and the Caribbean) grew at a considerably steadier pace, similar to the growth in non-OPEC imports (essentially Canada).

Figure 5 indicates the trends in OAPEC and non-OAPEC imports between 1955 and 1973. Prior to 1970, direct imports from the OAPEC countries--Algeria, Bahrein, Egypt, Iraq, Kuwait, Libya, Qatar, Saudi Arabia, Syria, and the United Arab Emirates--did not change appreciably, despite the major increase in total imports. Only in the last three years has their share of the U.S. market begun to grow appreciably. Indirect OAPEC imports (primarily products from Italy, the Bahamas, and the Virgin Islands) began to increase several years earlier. Since 1967, direct and indirect imports from the OAPEC countries have increased from less than 100 million to over 550 million barrels per year.

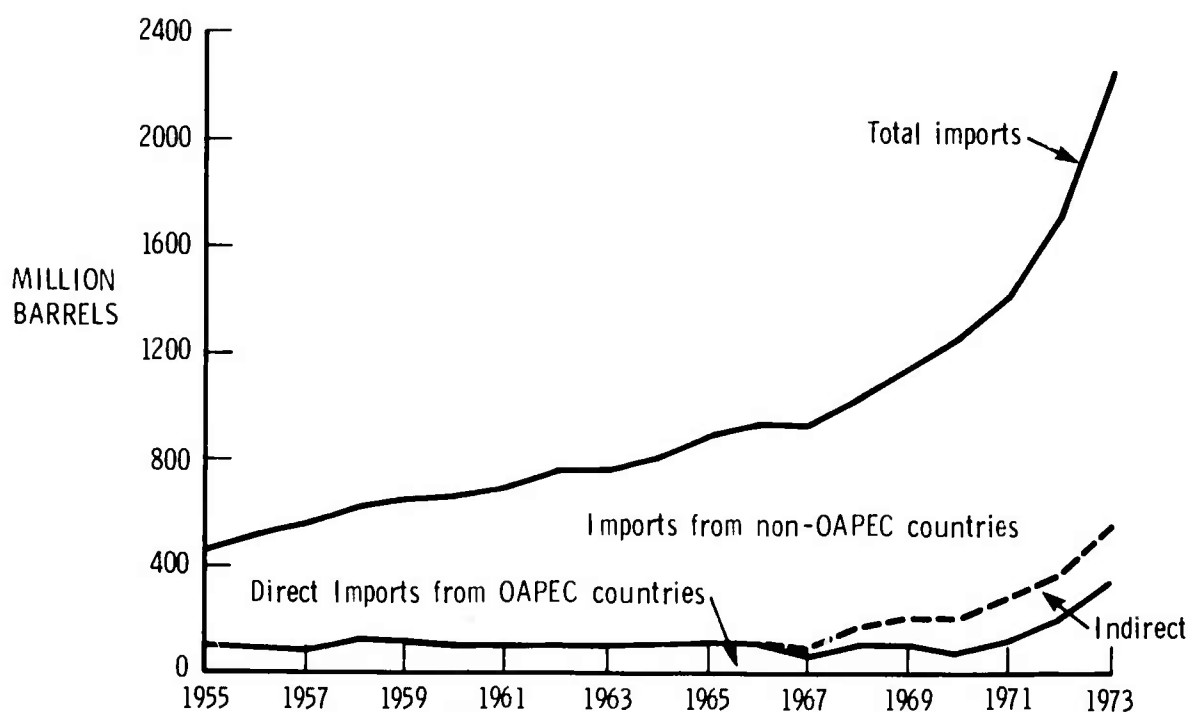


Fig. 5--Total petroleum imports by source, OAPEC and non-OAPEC, 1955-1973

The basic trends in crude oil imports roughly parallel those in total imports. From 1958 to 1970, crude oil imports from the Western Hemisphere grew 68 percent at a relatively steady rate, while crude imports from the Eastern Hemisphere remained substantially unchanged (Fig. 6). From 1970 to 1973, crude imports from the Eastern Hemisphere quadrupled, while imports from the Western Hemisphere grew by 57 percent. As a result, crude imports from the Eastern Hemisphere exceeded Western Hemisphere imports for the first time in 1973: 661 million versus 610 million barrels. Crude imports from the OPEC countries actually declined from 1958 to 1970 as Canadian crude imports expanded to make up nearly half of all crude imports by 1970. From 1970 to 1973, crude imports from the OPEC countries more than trebled, while Canadian crude imports grew by 65 percent. Crude oil imports from the OAPEC countries remained basically constant through 1971, then increased 165 percent, from 120 million to 317 million barrels in the next two years.

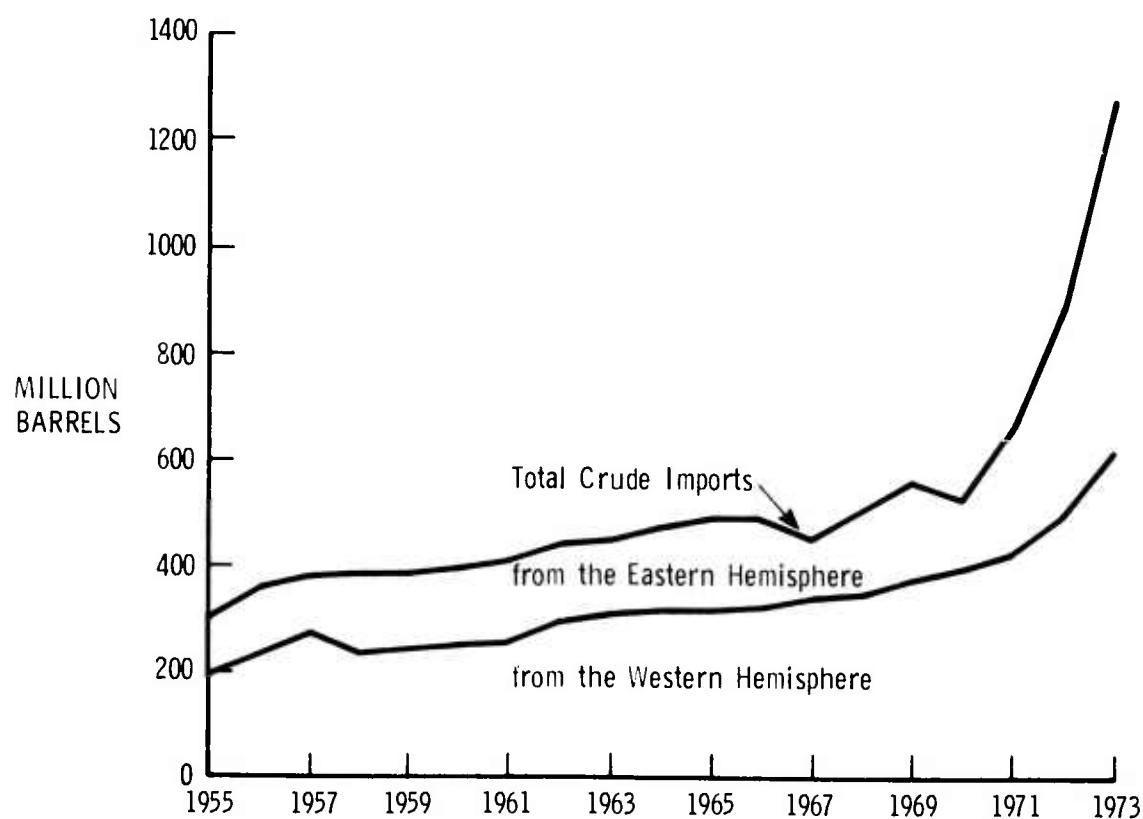


Fig. 6--Total crude oil imports by hemispheric source, 1955-1973

Unlike crude oil, petroleum product imports came overwhelmingly from Western Hemisphere refineries throughout the period. Prior to 1965, product imports from the Eastern Hemisphere were negligible. Since then they have grown modestly, coming primarily from European refineries. Product imports, reflecting the constraints of the Mandatory Oil Import Program, were predominantly (75 to 85 percent) residual fuel oil until 1973. But the share of other, more valuable products has grown considerably since 1967, increasing by 55 percent in 1973 alone to comprise nearly a third of all product imports. Residual fuel oil imports, unlike all other petroleum imports, grew at a remarkably steady rate, accelerated only moderately from 1968 to 1972 by the shift of electric utilities from coal to fuel oil because of air pollution control regulations. Residual imports during this period came primarily from Caribbean refineries, principally from the

large refineries in the Netherlands Antilles, Trinidad, and Venezuela, fed by heavy crude oil from Venezuelan fields. Beginning in the late 1960s, new refineries in the Bahamas and Virgin Islands, built specifically to serve East Coast markets and supplied primarily by low-sulfur crudes from Nigeria and North Africa, provided much of the subsequent increase in residual imports. Refineries in Canada and Italy provided most of the remainder.

From 1955 to 1973, imports from the Western Hemisphere grew steadily. Throughout this period there was a general preference for imports from Western Hemisphere countries; however, no general policy favoring them was ever adopted. The growth that did occur was primarily a result of the international price structure of crude oil, the demand for crude by continent, and the supply of crude by continent. Although the Eastern Hemisphere provided most of the increase in world oil production during this period, that increase barely kept pace with the rapid increase in demand in Western Europe and Japan. Since the international price structure was basically determined by the crude oil price in Texas and Louisiana and transportation costs forward or backward from that point, it made economic sense for the international oil companies to supply Western Europe with Middle Eastern and African crudes, Japan with Middle Eastern and Asian crudes, and the United States with petroleum from Canada and Venezuela. Only when the continued growth in U.S. demand outran the capability of Canada and Venezuela to supply all of the necessary increases in imports did Eastern Hemisphere sources assume prominence.

The composition of imports from the Western Hemisphere, both by source and by type, were substantially affected, however, by various facets of the Mandatory Oil Import Program. Product imports, encouraged by the gradual easing of restrictions on residual fuel oil imports, grew steadily and rapidly throughout the period (Fig. 7). Imports of crude oil grew slowly until 1971. With the loosening of import controls, they then grew 46 percent in the subsequent two years, growing nearly as much absolutely in those two years as in the preceding sixteen. That shift was particularly reflected in the composition of Venezuelan petroleum exports to the United States which,

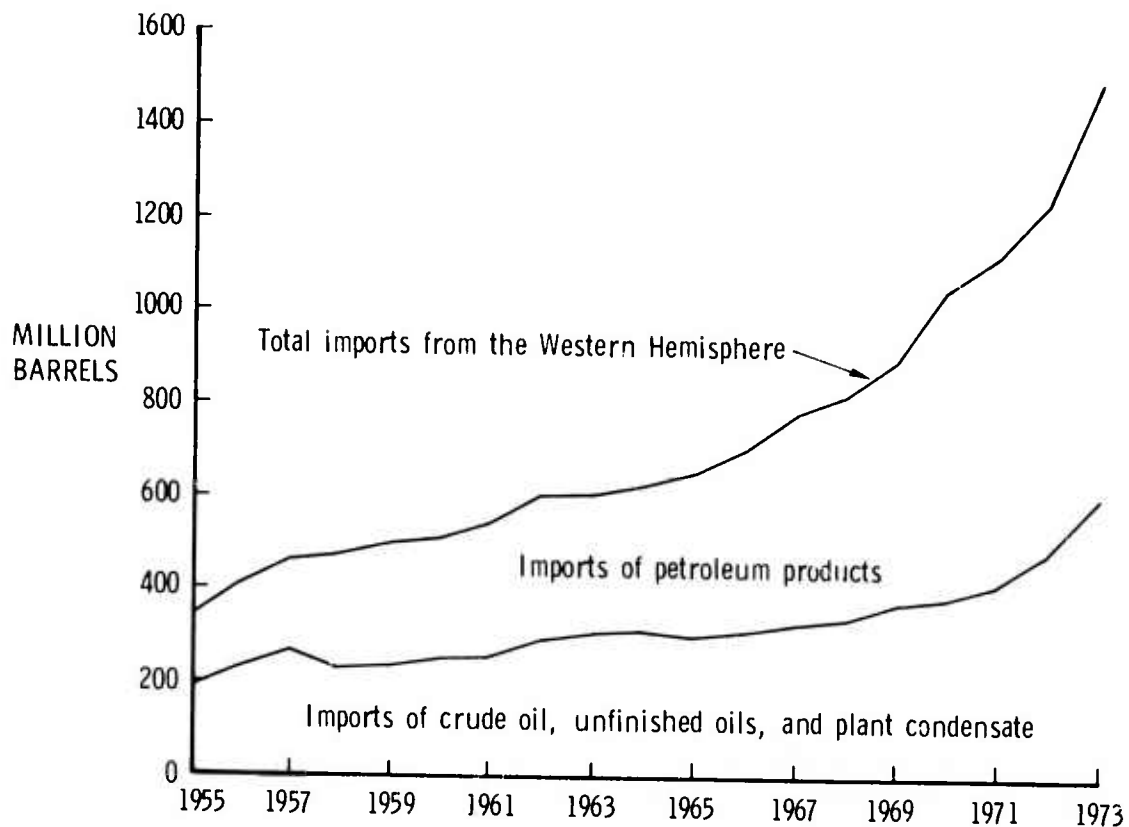


Fig. 7--Petroleum imports from the western hemisphere by type, 1955-1973

except for a temporary decline in the late 1960s, grew steadily from 1955 to 1973. However, they shifted from being predominantly crude oil (75 percent in 1955) to predominantly petroleum products (66 percent in 1973).

Three sources furnished the major share of direct petroleum imports from the western Hemisphere to the United States during this period: Canada, the Netherlands Antilles, and Venezuela (Fig. 8). Canadian imports, primarily crude oil, grew steadily, benefiting from the Overland Exemption of the Mandatory Oil Import Program, which exempted such oil from the import quotas of individual companies. Imports from Canada were still kept within the overall import limitation, however. Numerous attempts were also made to restrict their growth, particularly in the late 1960s, but they were noticeably unsuccessful.*

* Dam, op. cit., pp. 28-35.

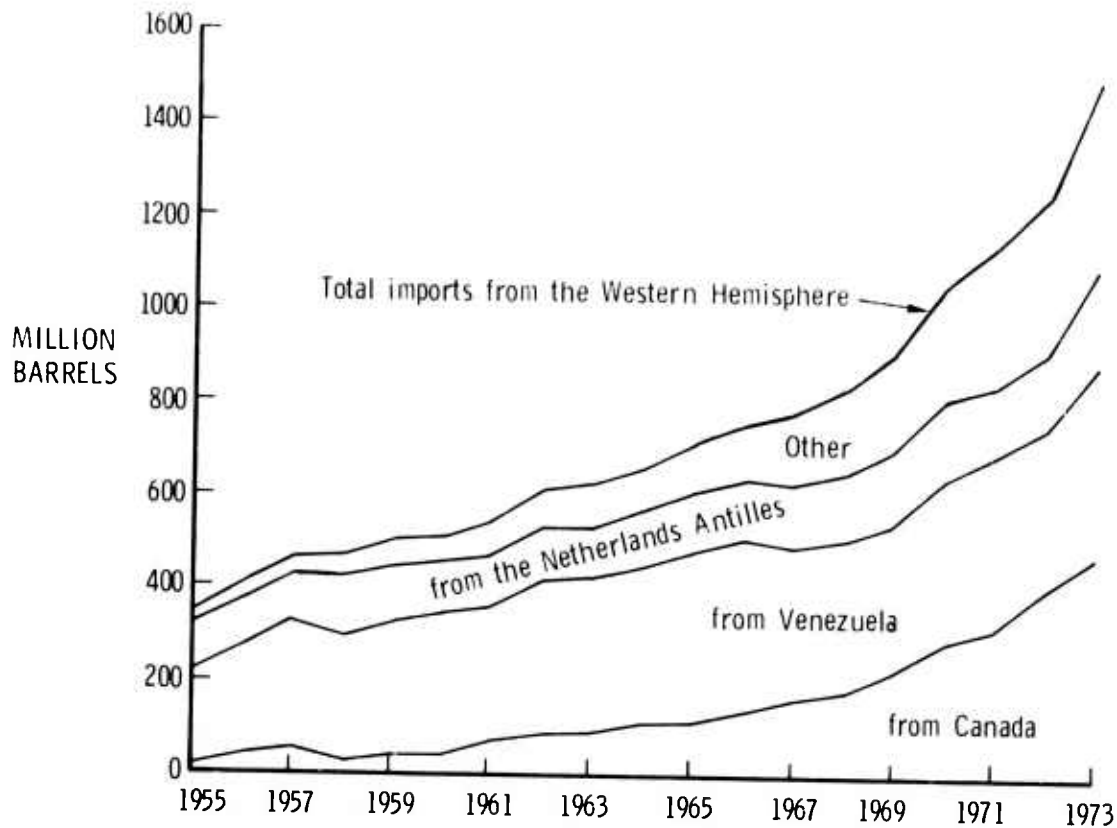


Fig. 8--Petroleum imports from the western hemisphere by source, 1955-1973

between 1955 and 1973, the relative shares of crude oil imports from Venezuela and Canada were reversed, crude imports from Canada increasing from less than 10 percent to more than 65 percent of total crude imports.

Throughout the period, product imports from the Western Hemisphere have come predominantly from the Netherlands Antilles and Venezuela. That concentration has diminished moderately since the late 1960s as new refinery capacity was built throughout the Caribbean. The dispersal was policy-induced. Refineries were built in Puerto Rico and the Virgin Islands as the result of special allocations granted under the Mandatory Oil Import Program. The refinery in the Bahamas, conveniently situated to serve the East Coast, was constructed shortly after the removal of restrictions on residual fuel imports into the East Coast.

The most obvious change in petroleum imports from the Eastern Hemisphere was the right-angle turn they took between 1970 and 1971 (Fig. 9). After being relatively stagnant from 1958 to 1970, they suddenly skyrocketed, increasing 51 percent in 1971, 59 percent in 1972, and 78 percent in 1973. Imports of crude oil were the dominant imports from the Eastern Hemisphere throughout the period. The sources of imports from the Eastern Hemisphere were considerably more diversified than those from the Western Hemisphere (Fig. 10). Prior to 1960, Kuwait dominated the picture, although Indonesia, Iran, and Saudi Arabia were also important sources. After 1959, Kuwait declined as Gulf Oil's allocation under the Mandatory Program was gradually reduced. After 1965, Nigeria and Libya became increasingly important. (See also Table 7 in Sec. V.)

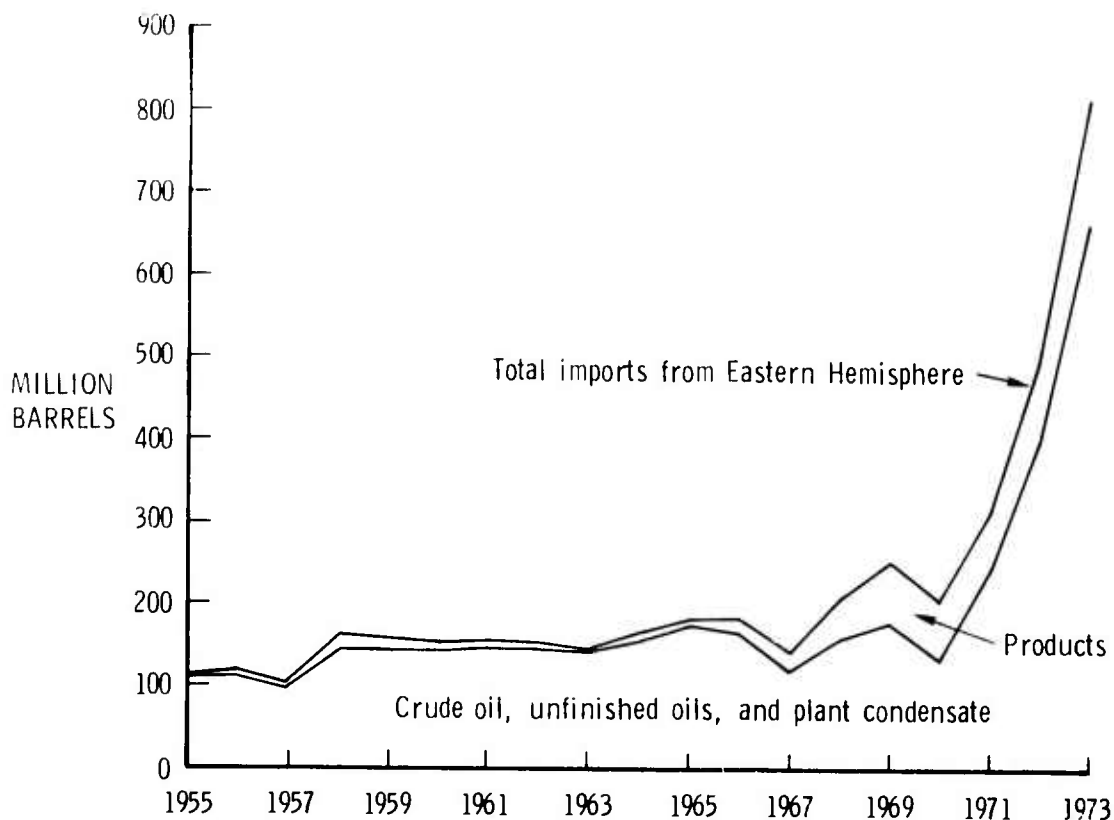


Fig. 9--Petroleum imports from the eastern hemisphere by type, 1955-1973

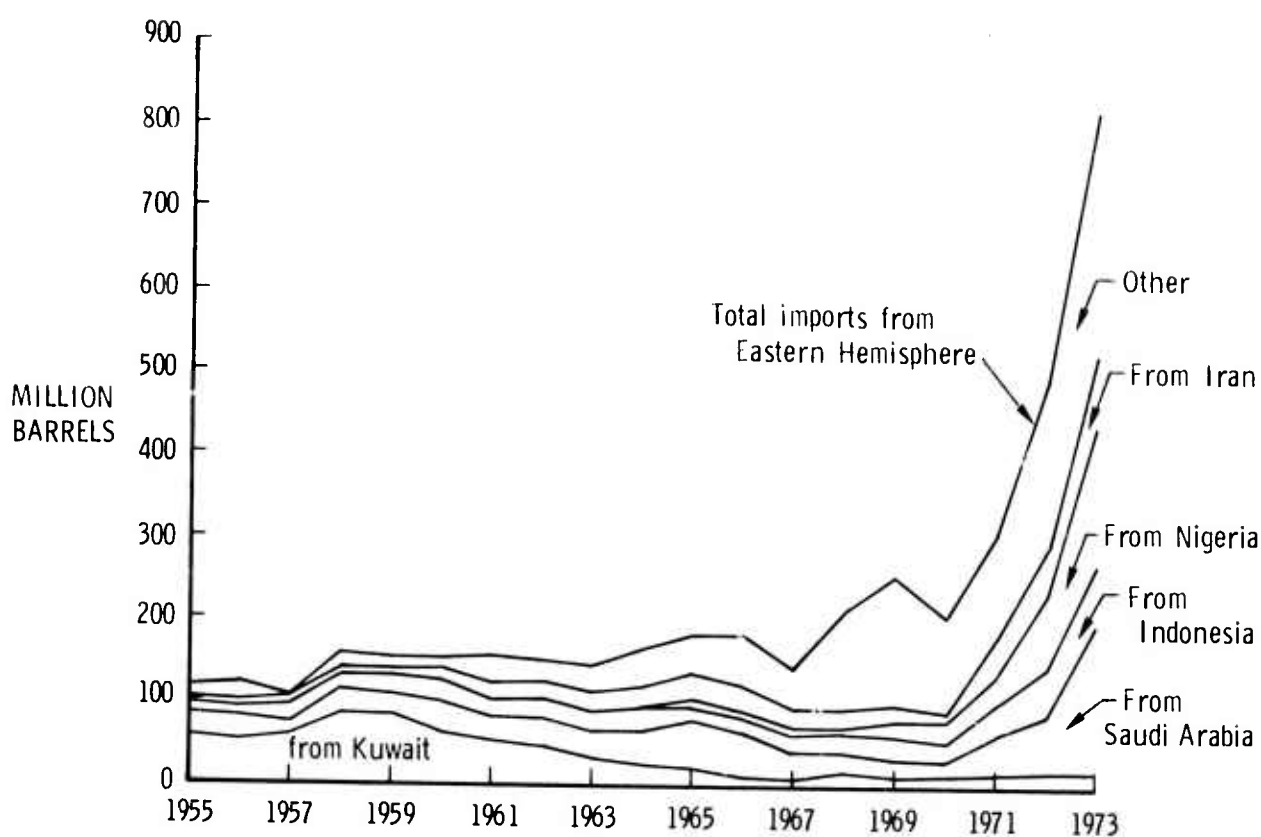


Fig. 10--Petroleum imports from the eastern hemisphere by source, 1955-1973

The trends in imports by regional source are reflected in the changes of major sources by country. Tables 3, 4, and 5 indicate the major immediate sources by country of U.S. imports of petroleum, crude oil, and petroleum products, respectively, from 1955 to 1973. (A major source for any one year is defined as any source providing more than 100,000 barrels per day or 36.5 million for the year.) Prior to 1970, only eight countries had been significant exporters of petroleum to the United States. Of these, only four--Canada, Venezuela, the Netherlands Antilles, and Trinidad--were consistently major sources, the former two of crude oil, the latter three of petroleum products. Since 1970, the growth in the number of major suppliers has paralleled the growth in imports. Six Eastern Hemisphere countries have become major suppliers of crude oil, two of which (Saudi Arabia and Nigeria) have displaced Venezuela from its

Table 3

MAJOR SOURCES OF PETROLEUM IMPORTS TO THE UNITED STATES, 1955-1973
(In million barrels)

<u>1955</u>		<u>1962</u>		<u>1968</u>		<u>1972</u>	
Venezuela	201.0	Venezuela	326.6	Venezuela	324.6	Canada	405.6
N.A.	98.9	N.A.	117.0	Canada	185.3	Venezuela	351.2
Kuwait	56.3	Canada	90.3	N.A.	143.1	N.A.	155.4
		Kuwait	46.6	Trinidad	69.2	Virgin Is.	120.9
				Libya	41.6	Nigeria	91.8
<u>1956</u>		<u>1963</u>				Trinidad	82.6
Venezuela	231.2	Venezuela	328.5	<u>1969</u>		Saudi Arabia	69.4
N.A.	101.4	N.A.	112.6	Venezuela	319.4	Bahamas	63.5
Kuwait	52.3	Canada	96.7	Canada	221.8	Indonesia	60.2
Canada	45.5	Trinidad	40.5	N.A.	163.9	Iran	51.9
<u>1957</u>		<u>1964</u>		Trinidad	78.6	Libya	44.9
Venezuela	275.5	Venezuela	341.6	Libya	48.9	Puerto Rico	37.2
N.A.	101.8	N.A.	122.0	Virgin Is.	42.6		
Kuwait	59.4	Canada	109.3	<u>1970</u>		<u>1973</u>	
Canada	56.8	Trinidad	42.4	Venezuela	361.2	Canada	479.2
<u>1958</u>		Saudi Arabia	39.1	Canada	279.8	Venezuela	410.5
Venezuela	269.1	<u>1965</u>		N.A.	174.2	N.A.	209.4
N.A.	126.3	Venezuela	362.9	Trinidad	78.9	Saudi Arabia	177.9
Kuwait	82.9	N.A.	131.6	Virgin Is.	68.8	Nigeria	167.5
<u>1959</u>		Canada	118.0	<u>1971</u>		Virgin Is.	115.4
Venezuela	288.8	Saudi Arabia	52.8	Venezuela	371.7	Trinidad	91.4
N.A.	122.8	Trinidad	48.2	Canada	312.8	Iran	81.3
Kuwait	77.5	<u>1966</u>		N.A.	156.4	Indonesia	77.6
<u>1960</u>		Venezuela	371.5	Virgin Is.	99.5	Bahamas	62.3
Venezuela	301.8	Canada	140.2	Trinidad	66.6	Libya	60.0
N.A.	116.3	N.A.	126.0	Bahamas	54.8	Algeria	48.9
Kuwait	64.7	Trinidad	55.8	Saudi Arabia	46.6	Italy	44.8
Canada	44.1	Saudi Arabia	50.1	Iran	40.8		
<u>1961</u>		<u>1967</u>		Indonesia	40.6		
Venezuela	286.3	Venezuela	342.2	Nigeria	37.3		
N.A.	115.8	Canada	164.2				
Canada	69.4	N.A.	131.0				
Kuwait	54.7	Trinidad	60.3				

SOURCE: U.S. Bureau of Mines. (See App. B.)

NOTE: N.A. = Netherlands Antilles.

Table 4

MAJOR SOURCES OF U.S. CRUDE OIL IMPORTS, 1955-1973

(In million barrels)

<u>1955</u>		<u>1963</u>		<u>1971</u>	
Venezuela	149.8	Venezuela	183.7	Canada	263.4
Kuwait	56.3	Canada	91.9	Venezuela	119.8
				Saudi Arabia	42.9
<u>1956</u>		<u>1964</u>		Indonesia	40.2
Venezuela	170.9	Venezuela	184.4	Iran	39.1
Kuwait	52.3	Canada	102.8		
Canada	43.2			<u>1972</u>	
		<u>1965</u>		Canada	343.8
<u>1957</u>		Venezuela	166.6	Venezuela	102.1
Venezuela	196.5	Canada	108.2	Nigeria	88.9
Kuwait	59.4	Saudi Arabia	50.0	Saudi Arabia	65.0
Canada	53.8			Indonesia	59.6
		<u>1966</u>		Iran	49.7
<u>1958</u>		Venezuela	159.5	Libya	40.1
Venezuela	177.0	Canada	127.1		
Kuwait	82.9	Saudi Arabia	47.7	<u>1973</u>	
				Canada	404.0
<u>1959</u>		<u>1967</u>		Saudi Arabia	172.4
Venezuela	180.6	Canada	151.6	Nigeria	163.7
Kuwait	77.5	Venezuela	143.9	Venezuela	139.7
				Iran	79.3
<u>1960</u>		<u>1968</u>		Indonesia	73.1
Venezuela	180.5	Canada	169.4	Libya	48.6
Kuwait	64.7	Venezuela	131.2	Algeria	43.6
Canada	41.0	Libya	41.6		
		<u>1969</u>			
<u>1961</u>		Canada	203.5		
Venezuela	158.3	Venezuela	116.6		
Canada	65.9	Libya	48.9		
Kuwait	54.7				
		<u>1970</u>			
<u>1962</u>		Canada	245.3		
Venezuela	179.8	Venezuela	107.5		
Canada	85.1				
Kuwait	46.6				

SOURCE: U.S. Bureau of Mines. (See App. B.)

Table 5

MAJOR SOURCES OF U.S. PETROLEUM PRODUCT IMPORTS,
1955-1973

(In million barrels)

<u>1955</u>		<u>1964</u>		<u>1971</u>	
N.A.	98.7	Venezuela	157.2	Venezuela	251.9
Venezuela	51.2	N.A.	119.8	N.A.	150.4
		Trinidad	38.9	Virgin Is.	89.8
<u>1956</u>				Trinidad	66.3
N.A.	100.6	<u>1965</u>		Bahamas	52.9
Venezuela	60.3	Venezuela	196.3	Canada	49.4
		N.A.	128.5		
<u>1957</u>		Trinidad	45.1	<u>1972</u>	
N.A.	101.4			Venezuela	249.1
Venezuela	79.0	<u>1966</u>		N.A.	152.4
		Venezuela	212.0	Virgin Is.	107.1
<u>1958</u>		N.A.	124.8	Trinidad	73.7
N.A.	118.3	Trinidad	52.9	Bahamas	62.8
Venezuela	92.1			Canada	61.8
		<u>1967</u>			
<u>1959</u>		Venezuela	198.3	<u>1973</u>	
N.A.	118.6	N.A.	130.8	Venezuela	270.8
Venezuela	108.2	Trinidad	58.2	N.A.	206.4
				Virgin Is.	110.9
<u>1960</u>		<u>1968</u>		Canada	75.2
Venezuela	121.3	Venezuela	193.4	Trinidad	67.1
N.A.	110.6	N.A.	140.2	Bahamas	61.2
		Trinidad	66.1	Italy	44.8
<u>1961</u>					
Venezuela	128.0	<u>1969</u>			
N.A.	107.6	Venezuela	202.8		
		N.A.	157.9		
<u>1962</u>		Trinidad	75.7		
Venezuela	146.8				
N.A.	112.1	<u>1970</u>			
		Venezuela	253.7		
<u>1963</u>		N.A.	168.0		
Venezuela	144.8	Trinidad	78.4		
N.A.	108.9	Virgin Is.	59.0		
Trinidad	38.4				

SOURCE: U.S. Bureau of Mines. (See App. B.)

NOTE: N.A. = Netherlands Antilles.

traditional position among the leading two suppliers. The number of Western Hemisphere countries that are major exporters of petroleum products to the United States has doubled, and one Eastern Hemisphere country has joined the list as well.

PERSPECTIVE OF EXPORTING COUNTRIES

The previous description treated U.S. petroleum imports from the perspective of the United States; Figs. 11 to 15 describe them from the perspective of the exporting countries. Five countries are treated separately: Canada, Trinidad, Venezuela, Nigeria, and Indonesia (Figs. 11-14). The Middle East countries, though in some cases major sources for the United States, were excluded because their exports to the United States were so small a proportion of their total production (less than 10 percent). Figure 15 compares these countries with Saudi Arabia, the largest source from the Middle East (the pattern

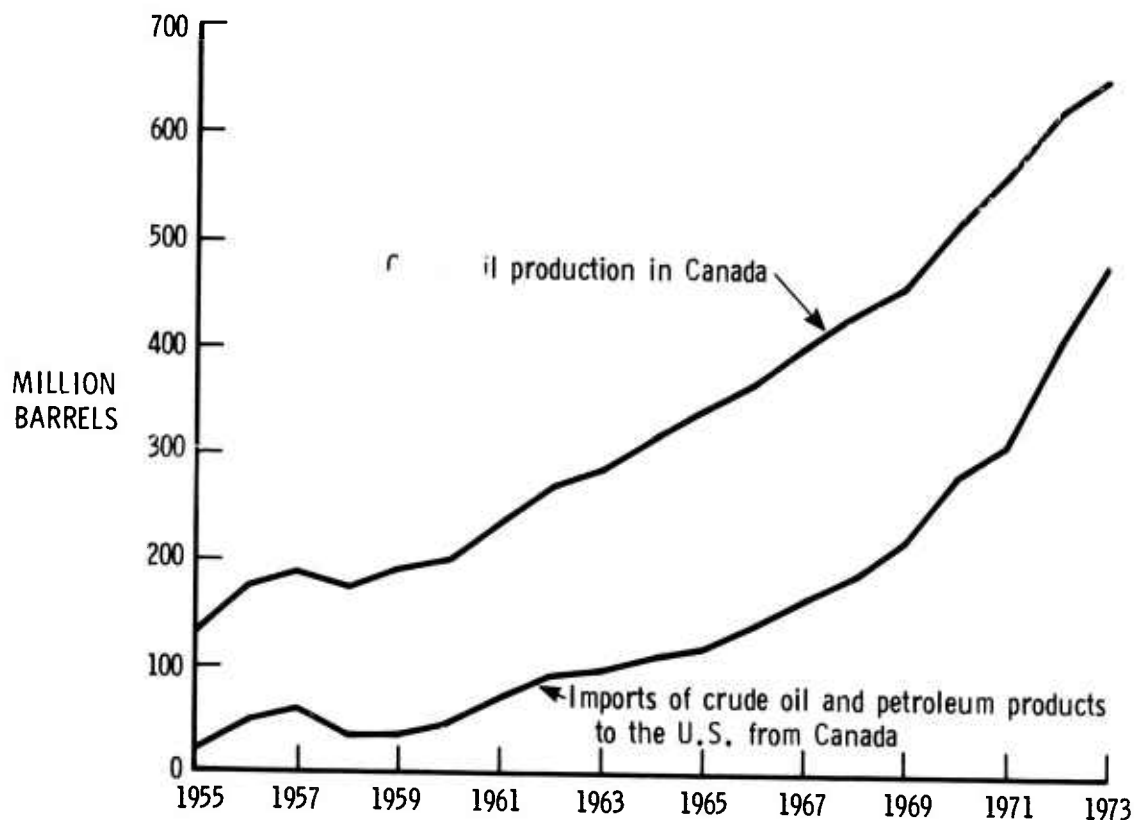


Fig. 11--Canadian crude oil production and petroleum exports to the United States, 1955-1973

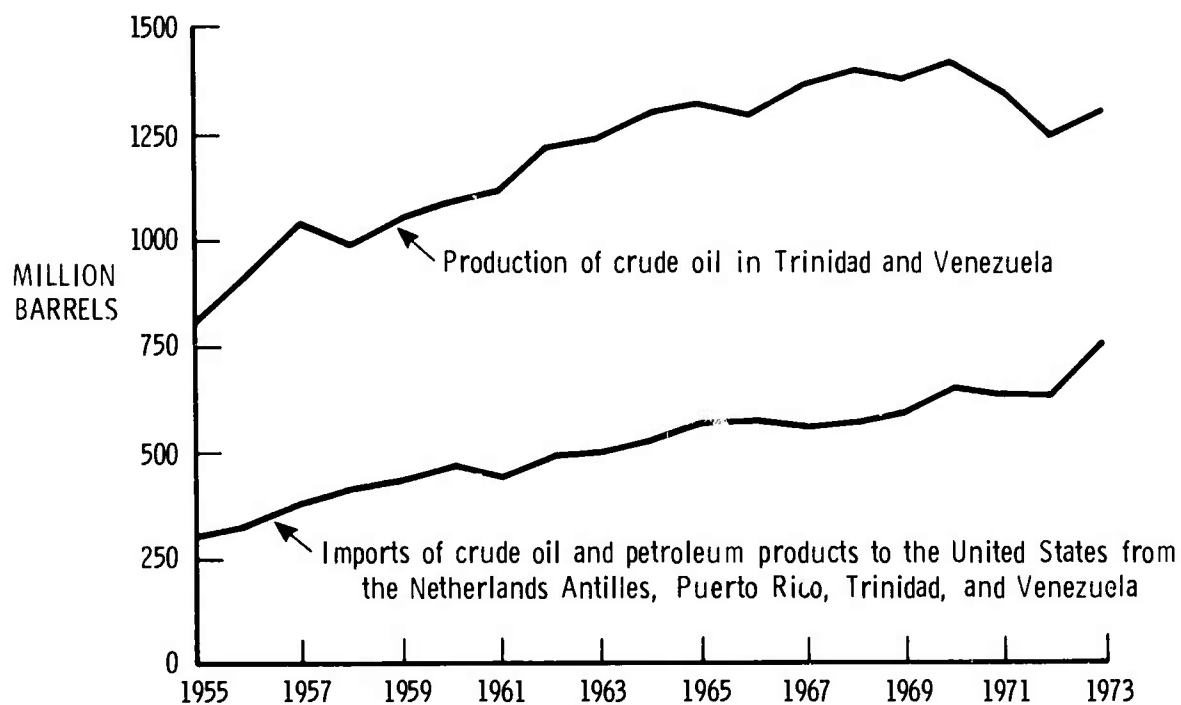


Fig. 12--Caribbean crude oil production and petroleum exports to the United States, 1955-1973

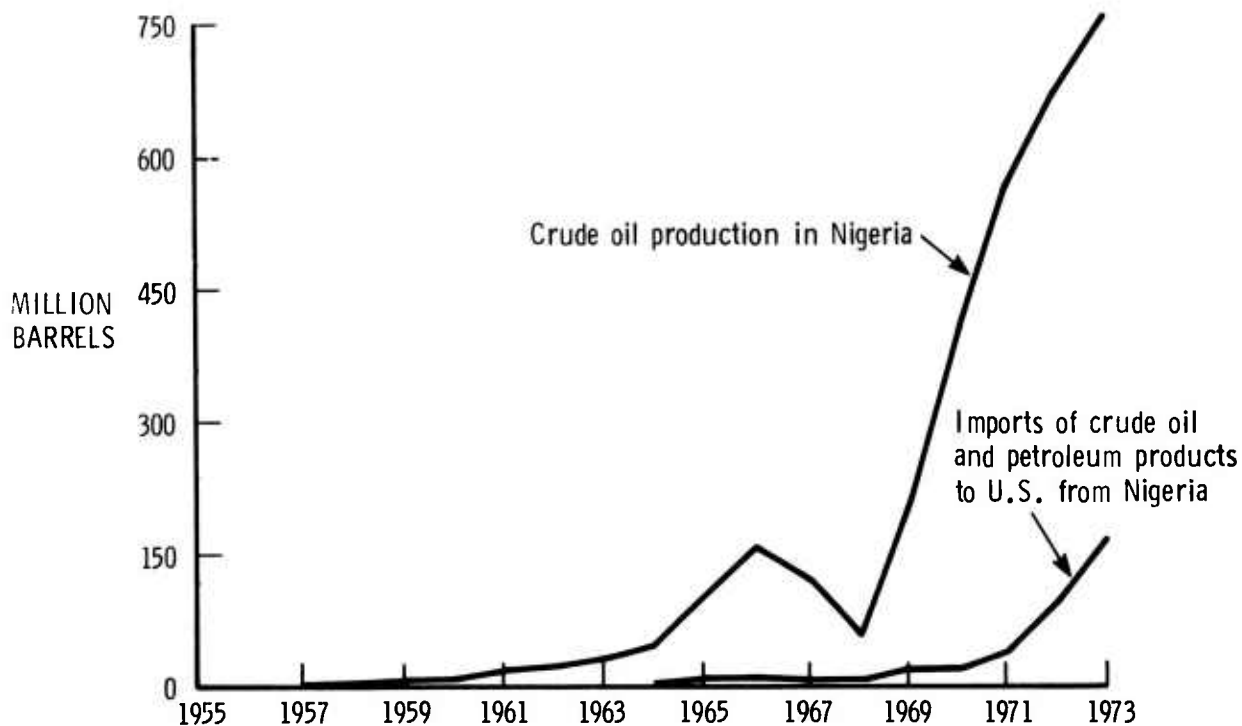


Fig. 13--Nigerian crude oil production and petroleum exports to the United States, 1955-1973

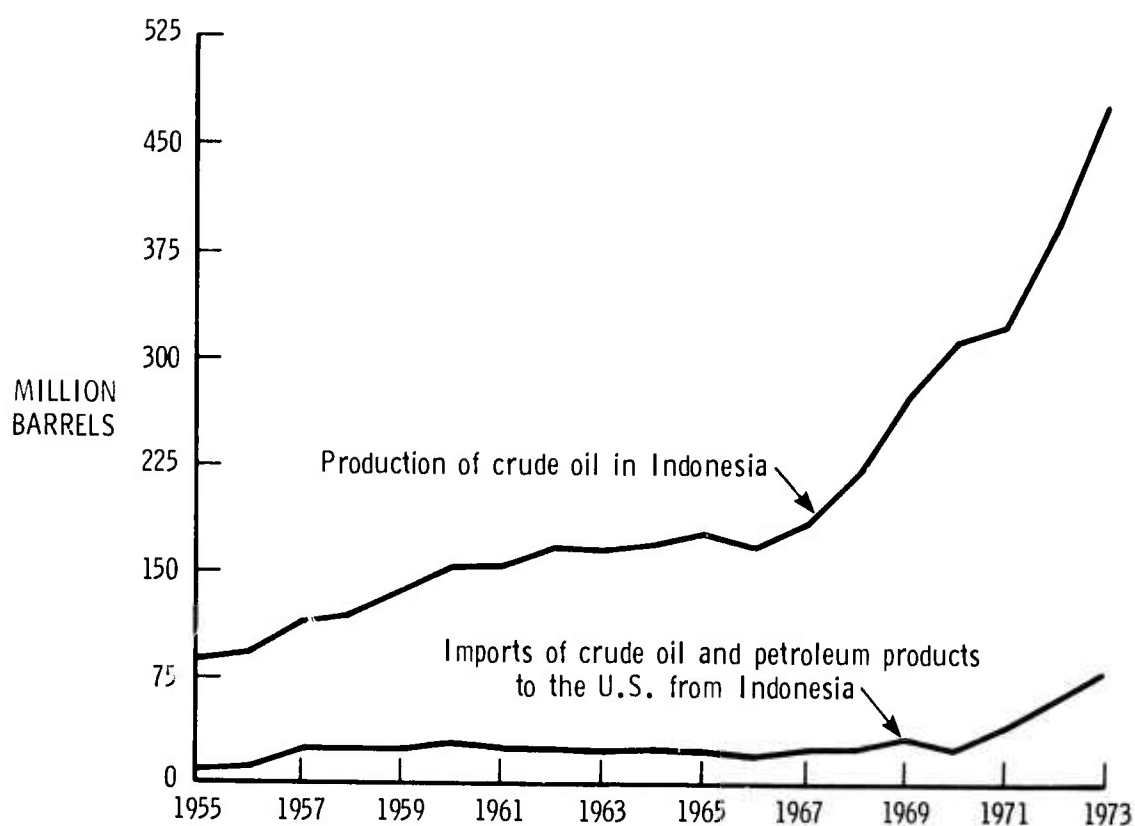


Fig. 14.--Indonesian crude oil production and petroleum exports to the United States, 1955-1973

for Iran is similar to but slightly below that of Saudi Arabia). As the figures indicate, Canada has exported a steadily increasing share of its crude oil production to the United States, approaching 70 percent of Canadian production in 1973 (the proportion excludes Canadian product imports to the East Coast, which are assumed to originate as crude from other countries). Imports from Trinidad and Venezuela (including crude oil refined in the Netherlands Antilles and Puerto Rico), began a similar, though slower, increase in 1965, which was interrupted for two years by the closing of the Suez Canal in 1967. No other country has sent more than 25 percent of its total production in any year to the United States. A growing proportion of the rapidly increasing production of low-sulfur crude oil in Nigeria has been coming to the United States since 1970. Imports of low-sulfur crude oil from Indonesia, after stabilizing from 1957 to 1970 between 20 to

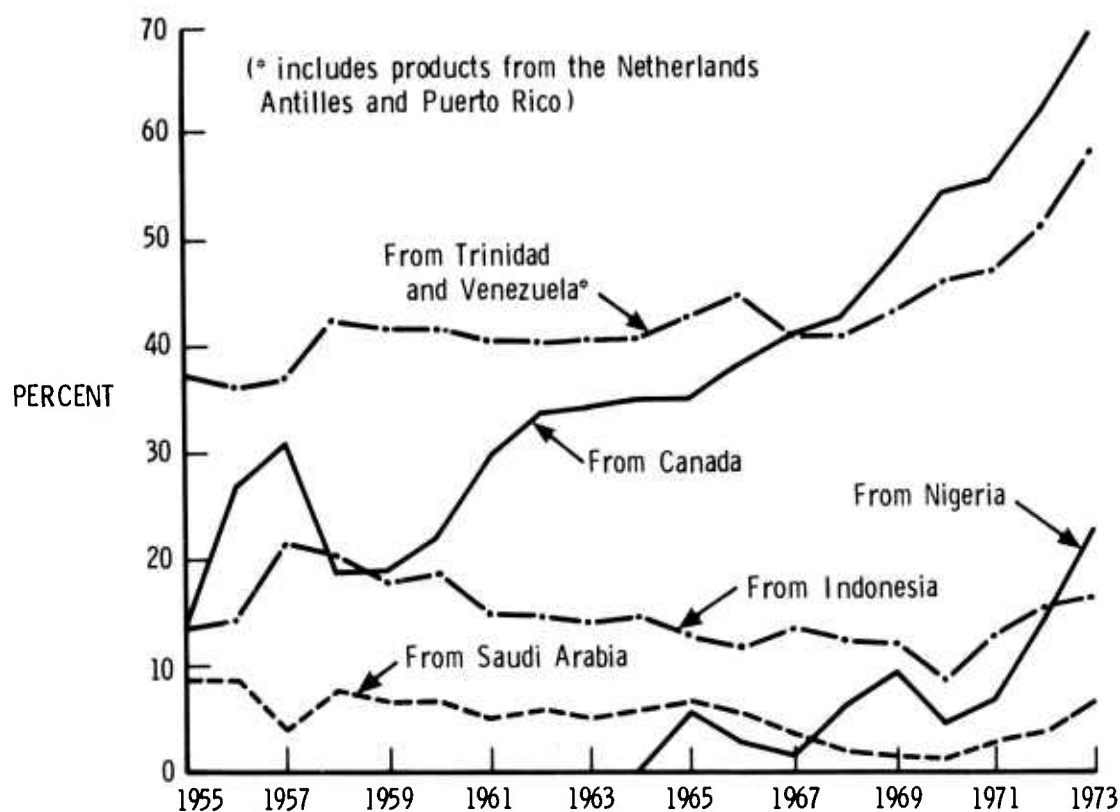


Fig. 15--Proportion of crude oil production exported to the United States by leading exporters, 1955-1973

30 million barrels annually, have also increased absolutely and proportionately as domestic production declined on the West Coast. Saudi Arabia, though providing nearly two-thirds of the petroleum imports that the United States received directly from the Persian Gulf countries in 1973, nonetheless shipped only 6.3 percent of its total production directly to the United States. Estimated indirect imports would increase that figure to only 8 or 9 percent.

SUMMARY

Through most of the period 1955 to 1973, import policy considerations affected both the level and the composition of petroleum imports. The effect on the level of imports was intentional and basically successful, though costly to the American consumer, until domestic oil producers ran out of excess productive capacity and could no longer

keep pace with growing demands. The effect on the composition of imports was largely unintentional, the by-product of other aspects of the Mandatory Oil Import Program. Moreover, those effects were dominated by and basically consonant with the basic dynamics of the international oil market. Until the last three years, most U.S. petroleum imports came from Western Hemisphere sources. Those sources still predominate; however, imports from the Eastern Hemisphere have recently surged and threaten to displace the Western Hemisphere as the leading source.

The following section examines possible trajectories of U.S. imports from 1973 to 1985 with regard to both level and composition, and relates the trajectories to the vulnerability of the United States to another embargo in the years ahead.

IV. OUTLOOK ON FUTURE IMPORTS AND THEIR VULNERABILITY,
1974 TO 1985

For some years to come the United States will be dependent on foreign producers for a sizable share of its petroleum supplies. Because of the long lead times required to develop domestic energy resources, the uncertainty facing operator-investors about the long-term path of energy prices, the current shortages of equipment and skilled manpower needed for expansion of domestic production, and the time required for energy demand to adjust to higher prices, the United States is not likely to achieve a stable equilibrium between domestic energy supply and demand at a significantly reduced level of imports before the 1980s. Until then, the United States will remain vulnerable in varying degrees to sudden cut-offs of petroleum imports. The greater the dependence on imports, the greater the vulnerability, because a good share of a high level of imports would necessarily have to come from sources that must be considered politically insecure. Measures for dealing with that risk will be an important component of any U.S. energy policy directed toward lessening import vulnerability, such as "Project Independence."

This section documents the desirability of such interim policy measures. In it we will consider possible *trajectories* of the overall level of U.S. petroleum imports* from 1973 to 1985, and the *composition* of those imports by country or group of countries. Several cases embodying a variety of assumptions will be used, because the situation from now until 1985 is dominated by great uncertainties. The major uncertainties are the future paths of world crude oil prices, the price expectations and reactions of consumers and producers, the potential petroleum resources that can actually be produced in the United States, and the extent to which bottlenecks to expanding production can be overcome in time. All the cases considered here will be based on

* Because this section examines the future dependence of the United States on imports, *net* imports rather than *gross* imports will be the focus of the analysis.

the general assumption that government and company policies actually will work to reduce dependence on foreign petroleum supplies. In particular, the cases will not reflect the possibilities that "Project Independence" will be a total failure or that it will be dropped as a major policy issue. The analysis focuses on a set of "best cases"; it examines what the situation will be assuming the more favorable range of possibilities for reducing dependence. The less favorable cases are excluded, simply because if they occur, vulnerability and the need to cope with it will obviously be greater.

Two basic possibilities regarding the relationship of foreign to domestic prices dominate the future import situation. While we may assume in both that the domestic price of crude oil will increase to at least \$7 to \$8 (in 1973 dollars), under the first possibility the delivered price of foreign crude oil will not drop below the domestic level. The second possibility is that the delivered price of foreign crude oil will drop below the domestic price, thus reproducing the situation that prevailed before 1973. Since the second possibility would create downward pressures on domestic oil prices, reduce the incentive to produce at home, and increase the incentive to import, it would seriously put in question the movement toward lesser import dependence on which this discussion is predicated or else require overall protectionist oil import policies. This analysis, focusing as it does on "best cases," will not consider this second possibility. Instead, it assumes only the first possibility, under which the need for import policies to increase reliability of supply is less immediately obvious but the implementation of such policies somewhat easier.

TRAJECTORIES OF TOTAL IMPORTS

The path of U.S. petroleum imports between now and 1985 depends primarily upon the changes that will occur in overall U.S. energy demand, in the U.S. demand for petroleum products, and in the supply of the various domestic energy sources. In exploring the future paths of U.S. petroleum imports, this report utilizes a parametric analysis of these three variables. *Two projections of the growth rate of total energy demand* will be used: an average annual growth rate of one

percent, and a rate of two percent. These two growth rates are substantially less than the 4.1 percent average growth rate in energy demand that prevailed between 1960 and 1973. We project lower growth rates in the future primarily because of consumer response to higher energy prices and other energy conservation efforts. Real energy prices have increased substantially and suddenly in the past year, an overall increase that is likely to be maintained as natural gas, electricity, and perhaps coal prices continue to increase, while petroleum prices may remain stable or decline only moderately. This analysis assumes a 30 percent to 50 percent increase in aggregate energy prices from 1971 to 1980. In contrast, real energy prices declined during the past two decades. The two projected rates assume moderate long-run price inelasticity of energy demand (ranging from -0.4 to -0.7). They assume an average annual growth in gross national product of 3.0 to 3.5 percent, declining from the 4.0 to 4.2 percent of the past decade because of policies to reduce inflation and lower population growth. An income elasticity of energy demand of 0.9 to 1.0 is also assumed. Both assume that the reaction to higher prices will be greatest in the earlier half of the period, producing a slower growth rate than in the latter half. These projections are purposely on the low side; higher rates of growth in demand up to 3.0 percent are possible.

In each of these two cases, *two different patterns in the composition of total energy supplies* are examined. At one percent average growth, the share of total energy demand supplied by petroleum is assumed to decrease from the 1973 level of 45.9 percent to 45 percent and 40 percent, respectively, by 1985. At two percent average growth, the share of total energy demand supplied by petroleum is assumed to decrease to 40 percent and 35 percent, respectively, by 1985. This indicates a sharp reversal in the trend of the past quarter century, during which the proportion of energy demand supplied by petroleum increased from 34.4 percent in 1947 to 45.9 percent in 1973. For the lower case used with each growth rate, petroleum demand is assumed to decrease slightly from present levels. For the higher case associated with each growth rate, petroleum demand is assumed to increase 10 percent from present levels by 1985. Each case implicitly incorporates

a different set of assumptions about the extent to which the domestic production of energy from coal, nuclear, and other sources can and will increase by 1985, providing substitutes for petroleum. But given that petroleum use is predominantly in the transportation sector, in refining, and in the petrochemical industry, the potential for near-term substitutes for most of its uses is limited, resulting in only relatively small declines in the assumed share of total energy supplied by petroleum.

For each of the four combinations of assumptions about the growth in domestic energy demand and in the change in the proportion of demand supplied by petroleum, *two alternative increases in the domestic supply of petroleum liquids* (crude oil, natural gas liquids, and syncrude from oil shale) are considered, an increase of 25 percent to 5 billion barrels (13.7 million b/d) by 1985, and an increase of 50 percent to 6 billion barrels (16.4 million b/d). In both cases, we assume major increases in production to lag behind the recent increases in the well-head price, occurring only several years from now as production from an expanded offshore leasing program begins, as improved recovery operations in existing fields come on line, as oil begins to flow through the Alaskan pipeline, and as oil shale production is developed. The two cases differ primarily in their estimates of the success of future onshore and offshore exploration, and of the extent of future discoveries on the North Slope. The two cases are roughly similar to Cases I and II developed by the National Petroleum Council in their *U.S. Energy Outlook*.

The assumptions underlying the projections of U.S. net petroleum imports, 1974 to 1985, are recapitulated in Table 6. Figures 16 and 17 depict the projected paths of imports resulting from the various combinations of these assumptions, as well as actual imports from 1971 to 1973. The shaded area in each figure is the range between an increase in the domestic supply of petroleum liquids of 25 percent by 1985 (upper boundary) and an increase of 50 percent (lower boundary). In all of the possibilities considered, net imports would decline from the 1973 level of 29.3 percent of U.S. consumption, but the 1985 level would vary from 26 percent of total petroleum demand at the upper bound

Table 6

BASIC ALTERNATIVE ASSUMPTIONS UNDERLYING IMPORT
PROJECTIONS, 1974 TO 1985

Item	Combination of Assumptions Used in:		
	Fig. 16	Fig. 17	Fig. 18
Average annual growth rate of U.S. energy consumption	1%	2%	2%
Proportion of total consumption supplied by petroleum in 1985			
Assumption (a)	40%	35%	35%
Assumption (b)	45%	40%	40%
Increase in annual domestic produc- tion of petroleum, 1973 to 1985			
Top line	25%	25%	38%
Bottom line	50%	50%	38%

of the range to zero net imports at the lower bound. Self-sufficiency by 1985 would be attained only under the most optimistic assumptions about the growth in domestic production of petroleum and other energy resources (Figs. 16a and 17a). Under less favorable assumptions about growth in domestic energy production (i.e., the least favorable ones considered here) net imports would begin to increase again in the mid-1980s. Under all the assumptions considered here, net imports would be substantially reduced by 1980, net imports providing 15 percent to 26 percent of domestic petroleum consumption by that year.

In all cases considered, substantial reductions in net petroleum imports would not begin until the late 1970s. This is a direct result of the assumed lead-times required to increase domestic production, both of petroleum and of other energy sources. The possibility is slim that a substantial reduction of imports could occur earlier. The analysis already assumes a growth in demand during the next few years that is less than the average for the 1973-1985 period. Some increases in domestic production of other energy sources are assumed as well. Oil from the North Slope (which provides 40 to 70 percent of the projected increase in domestic petroleum production) will not begin to

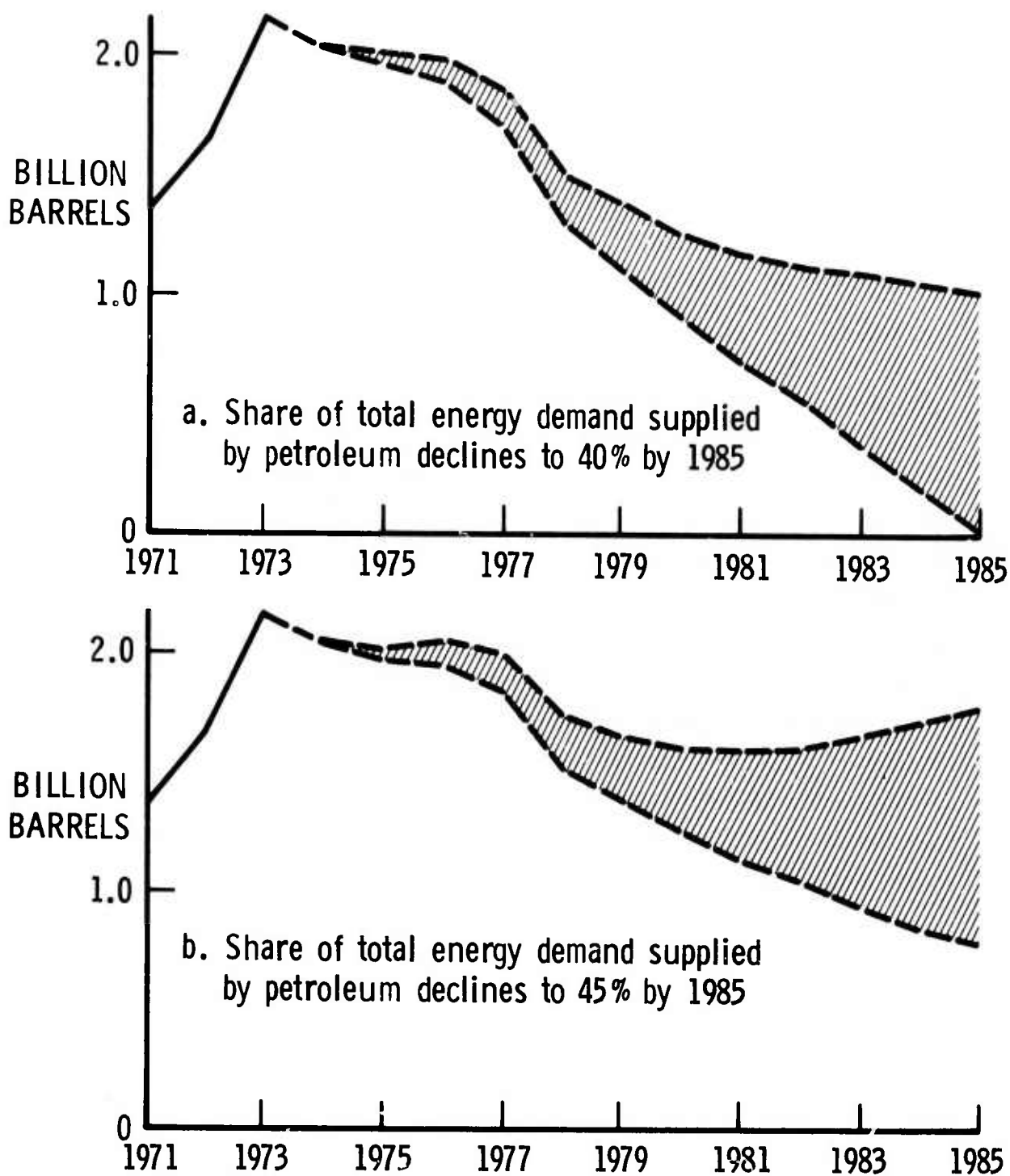


Fig. 16--Actual and projected petroleum imports, 1971-1985;
1.0 percent average annual growth in energy demand;
increases from 1973 to 1985 of domestic petroleum
production ranging from 25% to 50%

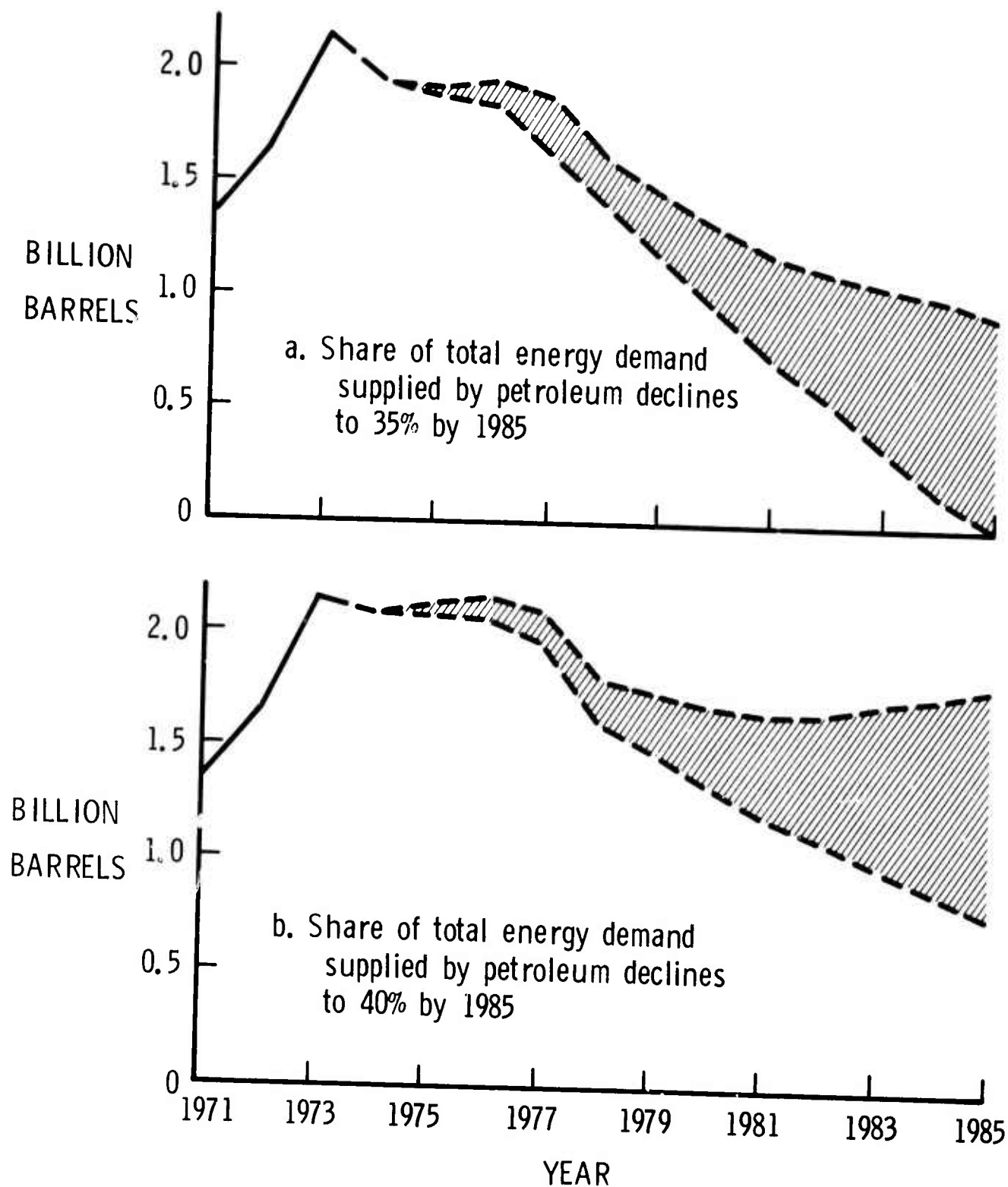


Fig. 17--Actual and projected petroleum imports, 1971-1985; 2.0 percent average annual growth in energy demand; increases from 1973 to 1985 of domestic petroleum production ranging from 25% to 50%

flow into U.S. markets until late 1977 and early 1978. Major increases in offshore production will not occur until three to five years after the initial leasing. Only production from existing fields could provide any noticeable increase beyond those assumed within the next three years. Yet, even if that source furnished more supply than is currently expected, reductions of more than 200 million barrels from the trajectories shown seem to be extremely unlikely. The bulge in oil imports between 1973 and 1977 appears to be an unavoidable feature of the future national energy situation, assuming of course that import flows are not disrupted during that time.

COMPOSITION OF FUTURE IMPORTS BY SOURCE

The vulnerability of the United States to import disruption in the near future depends on the composition of future imports as well as their overall level. From 1973 to 1985, the composition of U.S. imports by country of origin is likely to change dramatically. Three general sources are of particular interest: Canada, Latin America, and the Eastern Hemisphere.

In 1973, *Canada* was the single largest direct source of petroleum imports to the United States--22 percent of total oil imports, 31 percent of crude oil imports--and was second only to Venezuela as an ultimate source of imports. For the last fifteen years, Canadian petroleum production has been steadily increasing, with most of the increase being exported to the United States. Since 1970, reserves of crude oil and natural gas liquids in Canada have declined each year. The ratio of reserves to production is still high enough for production to continue to increase. At recent rates of reserve additions, however, production increases could occur only for several more years, and the rate of reserve additions appears unlikely to increase substantially. After the discovery of the Prudhoe Bay field in Alaska, estimates of the petroleum potential of the Canadian Arctic were highly optimistic; but several years of disappointing exploration efforts in search of crude oil in the Canadian Arctic and offshore Eastern Canada have dampened the hope for major discoveries in the Canadian frontier regions. Increased federal and provincial royalties and taxes, coupled

with only small increases in the prices paid to producers, have also discouraged exploration efforts in current producing areas in the Western provinces. The high capital requirements of syncrude production from tar sands limit the prospects for major increases in production from that source.

The deterioration in the prospects for Canadian oil production, the massive increases in the world price of oil, and the endeavors for a higher degree of national self-determination in economic affairs have produced a conspicuous turn in Canadian oil policy. Export allocations for 1974 have been reduced from 1973 levels. The Canadian government has adopted a dual-price system, imposing a substantial export charge on all Canadian petroleum exported to the United States. This export tax has made Canadian oil more expensive than nearly any other oil currently being refined in the United States. Moreover, the Canadian government has embarked on the extension of the Inter-provincial Pipeline System eastward to Montreal, an extension that would replace much of the oil imported into Quebec and Eastern Ontario with Canadian oil diverted from the U.S. Midwest and Pacific Northwest.* The National Energy Board may also set export reserve requirements for crude oil similar to those it has set for natural gas. The combined effect of these policy measures, the growth in Canadian demand, and a leveling off in Canadian petroleum production promises to be a steady reduction in Canadian exports to the United States, possibly to zero after 1980.†

* In 1972, nearly one million b/d of Western Canadian oil flowed into the United States, while Eastern Canada imported three-quarters of a million b/d from overseas, primarily Venezuela. The ultimate capacity of the proposed extension is 500,000 b/d, while current refining capacity in the Montreal area is 600,000 b/d. The Canadian government may decide to maintain excess capacity in the extension, delivering only, say, 300 to 400,000 b/d to Montreal under normal conditions.

† Minister of Energy, Mines and Resources, *An Energy Policy for Canada--Phase I*, Volume I, Ottawa, 1973, passim; and press reports. Temporarily at least, the switch of Eastern Canada from imports to West Canadian oil is retarded by water transportation costs and by import price subsidies under the government's uniform price policy. These subsidies are financed from export tax earnings and tend to

Historically, nearly all U.S. petroleum imports from Latin America have come from *Venezuela*, either directly as crude oil or petroleum products, or as products from refineries in the Netherlands Antilles, Puerto Rico, and Trinidad. During the past decade, production in Venezuela, unlike that in all of the other major petroleum exporting countries, has remained basically stable. During that time, published reserve estimates were declining, and Venezuelan reserve-to-production ratios were approaching U.S. levels (which are the lowest of any of the major producing countries). In early 1974, production was cut back by government decree, the stated reason being the conservation of natural gas that was being flared with production. Further gradual reductions, particularly if a high world price can be maintained (or possibly in order to maintain a high price!), are likely in the future. Although the Venezuelan government has indicated a desire to push exploration, efforts in the past few years have shown only modest promise. The government has shown some interest in developing the Orinoco heavy oil region, which has a potential several times greater than present Venezuelan reserves. The undesirable quality of this oil, which has both a very high sulfur content and a high metal content, and the substantial capital investment required to recover it, are likely to discourage any large-scale development in the near term.

The planned reversion of the properties of the foreign oil companies to the Venezuelan government by 1976 also poses some major uncertainties. The future role which the companies will play is yet to be determined, although there is a reasonable possibility of numerous service contracts. The effect of the transition on investment and hence future production will probably be unfavorable. Overall, the present situation suggests the following projection: Venezuelan production will decline moderately between now and 1985. Venezuelan exports to Canada will decline to minimal levels by 1980, and exports to Western Europe will continue to decline. Petroleum demand in Venezuela itself will increase, along with exports to other Latin American

keep imports competitive with shipments by tanker from the West. But subsidization of such shipments is under consideration, and the pipeline would resolve the transport cost problem.

countries. The result is likely to be a continuing though modest decline in Venezuelan exports to the United States from 1973 to 1985.

During the next decade, three other Latin American countries are likely to be exporters of petroleum: *Ecuador*, *Peru*, and *Trinidad*. Ecuador seemed on its way to becoming a significant source after a rapid succession of major discoveries in the early 1970s. With the completion of the Trans-Ecuadorian pipeline in late 1972, it became a modest exporter. However, the Ecuadorian government has since cancelled leases, reduced concessions, increased royalties, reduced production, and announced plans for reversion. At best, only modest future export increases can be expected. Peru appears promising, but exploration and development there have not progressed far enough yet to make conclusive judgments on its potential. Construction is beginning on a trans-Andean pipeline with an ultimate capacity of 350,000 barrels per day. Under service-type contracts, relationships between the government and the companies are reasonably smooth. But new production will serve primarily to make Peru self-sufficient and to provide oil for other Latin American nations. Japan has already contracted for most of the rest. Trinidad has the smallest potential of the three and is unlikely to increase production to any significant degree.

Figure 18 depicts the implications of the changing situation in Canada and Latin America for the composition of U.S. imports from 1973 to 1985. Two cases are presented (see Table 6 above). In both, we assume a 2 percent average annual growth in total U.S. energy demand, and an increase in domestic petroleum production to 15.1 million b/d by 1985 (or by 38 percent over 1973, the average of the range used in Figs. 16 and 17). The first case (Fig. 18a) assumes that the share of total demand supplied by petroleum will decrease to 35 percent by 1985, with domestic production of natural gas, coal, and electricity from nuclear power, hydropower, and other energy sources increasing by 50 percent. The second case (Fig. 18b) assumes that the share of total demand supplied by petroleum will decrease to 40 percent by 1985, with domestic production of other energy sources increasing by 38 percent. In the first case, petroleum imports are reduced to 7

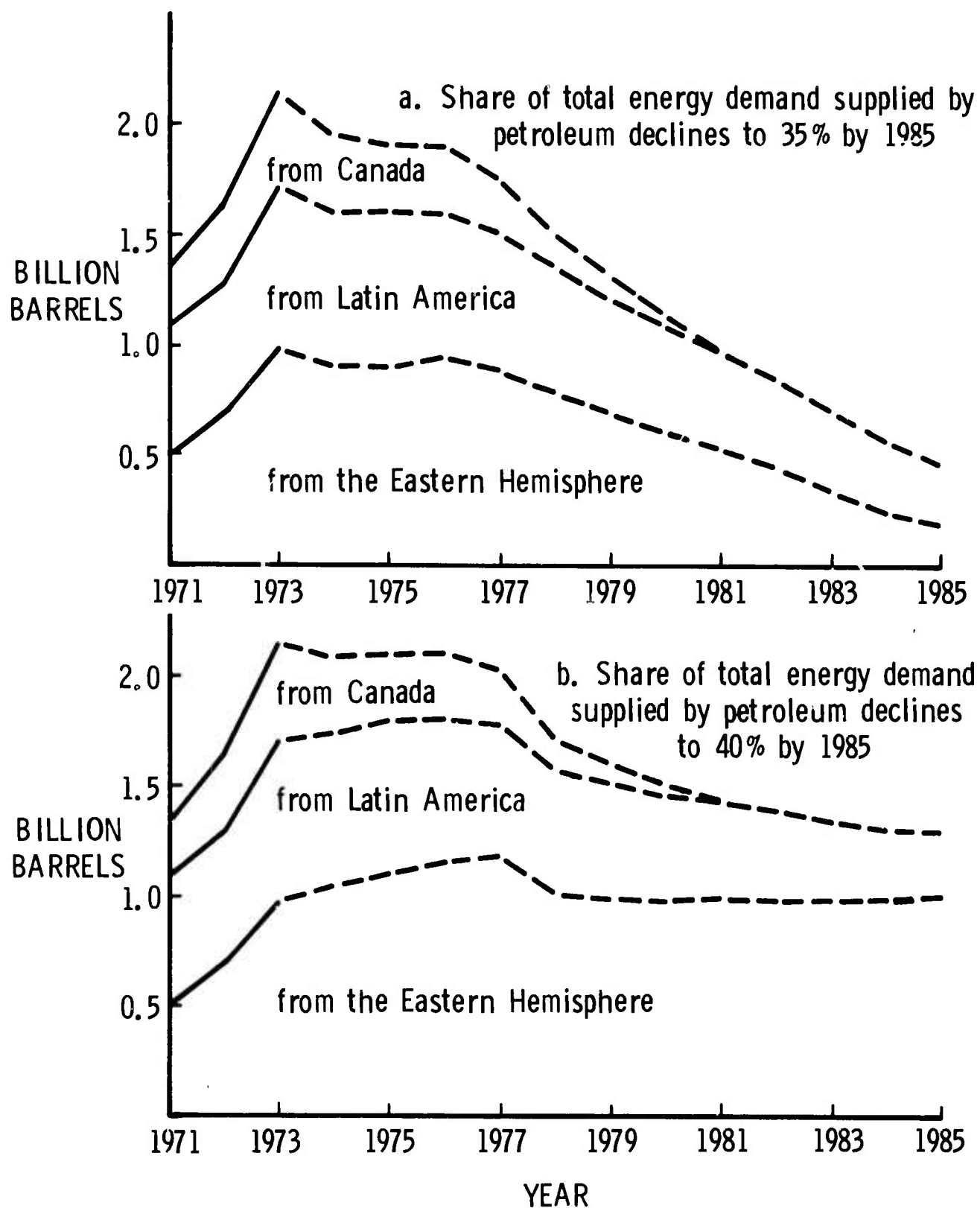


Fig. 18--Actual and projected petroleum imports by source, 1971-1985

percent of total petroleum demand; in the second, imports are reduced to 19 percent of total petroleum demand. In both cases, net imports from Canada are eliminated after 1980, and imports from Latin America slowly but steadily decline throughout the period. Both cases assume that the Eastern Hemisphere supplies the remainder.

In both cases, nearly all of the initial decline in imports comes from what have historically been regarded as secure sources. In both, the mid-1970s bulge of imports from the Eastern Hemisphere is even more noticeable than the similar bulge in total imports. Total imports from the Eastern Hemisphere are reduced significantly below 1973 levels after 1980 only if domestic production from other energy sources increases dramatically, reducing the share of total demand supplied by petroleum and drastically reducing total petroleum imports.

Could the course of events in the next decade produce a situation significantly better than those projected? The assumptions used about the decline in the growth of total energy demand and the increase in domestic energy production were all optimistic. Only under the *most* optimistic assumptions within the range of "best cases" examined would the dependence on Eastern Hemisphere imports be significantly reduced. For example, if the Canadian federal and provincial governments allowed a higher price to be paid to petroleum producers in the Western provinces, thus inducing more exploration and production there, and if some large discoveries were made in the Canadian frontier areas, their planned export policies might relax. But any major relaxation permitting U.S. imports of more than 100 million barrels annually after 1980 appears to be only a remote possibility. Or, the transition during reversion of the Venezuelan oil industry might be relatively smooth, the government providing substantial new investment for exploration and field development. If other producing states reduced production and Venezuela enjoyed major reserve additions, it would not have to reduce production beyond present levels. These events, singly or in combination, could reduce Eastern Hemisphere imports below the levels shown in Fig. 18. But they present the *best* possible circumstances for such reductions. More realistic projections cannot be so sanguine.

From 1973 to 1985, the composition by source of petroleum imports

to the United States from *Eastern Hemisphere* countries may change significantly as well. The extent to which changes will occur depends upon changes in petroleum production in the exporting countries, changes in production in the importing countries (creating displacements or shortfalls of exports), and policy-induced shifts in export patterns. This section of the report will primarily consider the first two, emphasizing those factors over which U.S. policies have relatively minor influence. Section V will consider the prospects for policy-induced changes. Two groupings will be considered briefly here: (1) the non-Arab exporting countries (Indonesia, Iran, and Nigeria), (2) the Arab exporting countries (Algeria, Iraq, Kuwait, Libya, Saudi Arabia, and the United Arab Emirates).

Indonesia and Nigeria share many characteristics. They have the largest populations of the major oil exporting countries (125 million and 70 million, respectively), the lowest per capita incomes, high rates of unemployment, and great income inequities. Both have enjoyed a series of large field discoveries in the 50 to 500 million barrel range over the past decade, and both still have excellent prospects for continued exploratory successes. Both have increased production steadily of late, and plan substantial future increases, although Nigeria has been and promises to be more successful in increasing production.* Nigeria is likely to increase its exports to the United States, but the long-run outlook for Indonesian exports to the United States is uncertain. Increased production in Nigeria, coupled with a decline in exports to the United Kingdom and northwestern Europe as Nigerian oil is displaced by North Sea oil, would create an export potential that the United States could utilize. Increased production in Indonesia could result in increased exports to the United States prior to 1978. But after 1978, increased shipments of Alaskan oil to the West Coast--the current destination of nearly all Indonesian imports to the United States--might displace all imports west of the Rockies

* Companies operating in Nigeria expect West African oil output to rise from 2.5 million b/d in 1973 to 4.2 million b/d by 1980, with a decline likely to set in thereafter.

unless arrangements are made for shipment of oil from the West Coast to areas east of the Rockies (see below, p. 86).

Production in *Iran* had been planned to increase to 8.5 million barrels per day by 1977 from a present level slightly greater than 6 million b/d, and to stabilize at this higher level. But expectations for major reserve additions have been dampened and the production plans currently under discussion forecast only modest increases of 6.5 to 7 million b/d in the late 1970s.* Iran will continue to need large amounts of foreign exchange from oil sales to finance its plans for internal development and armament. But it has also been among the leading voices in OPEC for higher prices. If prices continued to erode, Iran might be one of the OPEC nations that collectively or individually will restrict production to maintain a high world price. If Iranian production is not cut, some increases in exports to the United States are likely.

PRODUCTION AND EXPORTS OF ARAB COUNTRIES

If the threat of future disruptions could be put aside, we could regard the Arab oil-producing countries as the most promising substitute for declining Western Hemisphere sources of U.S. imports. The following paragraphs consider the outlook for oil production and exports to all destinations of the principal suppliers, leaving open the question of the extent to which it would be prudent for the United States to avail itself of these exports.

Political uncertainties dominate the future outlook for exports from the principal Arab producing countries (Algeria, Iraq, Kuwait, Libya, Saudi Arabia, and the United Arab Emirates). All could increase production substantially over the next few years, for reserves in each are forty to sixty times current production rates. With the exception of Kuwait, all have considerable potential for further discoveries. But all reduced production substantially during the embargo, and four--Algeria, Iraq, Kuwait, and Libya--have also curtailed production for other reasons during the past five years.

* *Petroleum Intelligence Weekly*, July 15, 1974.

Saudi Arabia, as is well known, is the predominant Arab producer, having nearly half of Arab reserves and production. The largest exporter of petroleum in the world since 1970, it may also become the largest producer of crude oil this year or next, displacing the United States from the position it has held (except for four years around the turn of the century) since the beginning of the petroleum industry in 1859. It is also the leading Arab exporter to the United States and, through Aramco, has maintained amicable working relationships with U.S.-based oil companies--relationships that have been evolving in the direction of full Saudi control over investments, production, and prices. Despite Saudi Arabia's dominant position in the world oil market, the prospects for continued increases in Saudi production are mixed. Exploration and development are continuing with the encouragement of the Saudi government; but the ability of Saudi Arabia, with its small population, to absorb skyrocketing oil revenues is limited and its ability or willingness to engage in commensurate foreign investments is dubious. Continued rapid production increases to the once commonly quoted level of 20 million barrels per day by 1980 now seem out of the question. The range of more likely estimates appears to be between modest increases and modest decreases. The former could easily yield higher exports to the United States; the latter would leave the production-maximizing OPEC countries as incremental sources of U.S. imports.

Because they produce low-sulfur oil, Algeria and Libya have been major exporters to the United States in recent years, both directly and indirectly. Production in Algeria has grown only slowly since 1968; Libyan production has declined substantially since 1970, primarily because of continuing disputes between the Libyan government and the foreign companies operating in Libya. Although working relationships between both governments and the companies now appear to be improving, neither government has indicated substantial interest in increasing production. A continued increase in Nigerian exports to the United States and the planned substantial expansion of U.S. refinery desulfurization capability may slow down or even eliminate the continued growth in U.S. imports from these two countries.

The other three major Arab exporters--Iraq, Kuwait, and the United Arab Emirates--have not recently been major exporters to the United States, although Kuwait was so in the late 1950s. This situation may change. Both Iraq and the United Arab Emirates plan continued increases in production, Iraq substantially so with a recently announced production target of 6 million barrels per day by 1981 from the present 2 million barrel level.* Whether such plans can be sustained in the future international petroleum market is uncertain. Political relations apart, Iraq could easily become a substantial exporter to the United States, and U.S. imports from the United Arab Emirates could continue the recent pattern of small but steady increases. Kuwait, faced with only minor prospects for additional discoveries and potential difficulties in managing the large inflow of oil revenues, has already established a production ceiling below recent production levels and may reduce it even further. Increased exports to the United States from Kuwait seem unlikely.

U.S. VULNERABILITY TO EMBARGO IN THE NEAR FUTURE

The burden of the preceding analysis is that prospective developments in foreign sources of supply are on balance not favorable to reducing the vulnerability of U.S. consumers to a renewed Arab oil embargo in the near future. This vulnerability remains great even if we assume a growth rate of consumption this year and in the next few years considerably lower than the four percent (plus) rate of the recent past, and a fairly substantial growth of domestic production, albeit with unavoidable time lags. While aggregate oil imports into the United States will not continue to rise under these assumptions at anything like the fantastic pace imagined in pre-embargo days, they will probably not decline immediately and rapidly, either. Aggregate U.S. oil imports in late 1974 may well run at a rate above that of mid-1973. Imports from the Eastern Hemisphere will almost certainly do so; and the proportion of U.S. imports coming from Arab sources is likely to be higher for a while than in the recent past. Thus, even if the U.S.

* *Petroleum Intelligence Weekly*, June 10, 1974.

consumer's overall dependence on imported oil were to diminish in the time immediately ahead, he may well be more dependent on oil from Arab sources than he was in 1973.

This prospect of continuing U.S. vulnerability to Arab embargoes is not mitigated by a near-term prospect for significantly decreased vulnerability of Japan and Western Europe to Arab supply restrictions. The United States still could not count on those countries as sources of supply in an emergency. True, consumption growth in those countries appears to have slowed down, too, as of mid-1974--thanks to price increases and, in places, lessened economic growth. They also have their own variants of our "Project Independence," with North Sea oil and some revival of coal exploitation offering near-term prospects, and nuclear energy and oil finds in East Asia more distant prospects. Recent OECD estimates appear to allow for an increase of overall energy demand in the 24-nation area at a rate of 3 rather than 5 percent annually in the decade ahead.* Likewise, European Community prognosticators have recently scaled down their precrisis estimates of 1985 aggregate energy demand in the nine member countries of the Common Market from 1800 million tons of oil equivalent (Mtoe) to 1575 Mtoe (1973, 1005 Mtoe) overall, and for oil alone quite drastically from 1160 Mt to 655 Mt (1973, 617 Mt).† But for the years immediately ahead, it would be foolhardy to assume that those developments will generate anything like a European energy reserve capacity to which the United States could hope to have access in the event of a renewed Arab embargo. At best, they would make the European (hardly the Japanese) economies a little less dependent on Arab oil, and European governments a little less frantic in the face of its curtailment, but for the next few years even that should not be expected.‡

* *Petroleum Intelligence Weekly*, May 20, 1974.

† Commission of the European Communities, *Towards a New Energy Policy Strategy for the European Community*, Brussels, May 29, 1974, p. 10.

‡ This generalization may not hold for an exceptional case like that of Norway, where offshore oil development promises to replace hitherto complete import dependence with substantial export capacity in the next few years. Toward the end of the decade, Britain, too, is expected to end its dependence on imported crude oil, with a production

The foregoing is not meant to ignore the possibility that we may run into some kind of oil glut later this year or thereafter, as a result of an economic recession in industrial countries or other developments. Hard times might temporarily blunt the Arabs' "oil weapon" and thus suspend the likelihood of its application.

In the face of these prospects, it is likely that in the near term the relationship between foreign policy and "energy self-sufficiency" is going to work in exactly the opposite sense to the way it was presented in the formulation of "Project Independence." While the Project was offered as a means to free U.S. foreign policy from the constraints imposed by the country's dependence on "foreign" (read "Arab") oil, foreign policy in the near term is likely to be used to keep Arab rulers from exploiting an increased U.S. dependence on their oil. Embargo (supply curtailment) prevention bids fair to be a priority objective of U.S. foreign policy for some time. It now appears to be the hope of many in the government and in the oil companies that diplomacy will permit the country to live with a high vulnerability to oil blackmail that energy policy cannot soon reduce significantly. To that end, U.S. diplomacy has recently made unprecedented efforts.*

But diplomacy is no more a miracle machine than is energy policy. Both have their opportunities, their costs, and their risks. The opportunities, which U.S. foreign policy has been addressing, are (1) to enlist some important Arab governments, notably Saudi Arabia and Egypt, in economic, financial, and defense-related relationships with the United States that would dispose them against a resumption of economic

level of North Sea oil currently estimated by the British government at 2 to 2.8 million b/d in 1980. *Petroleum Intelligence Weekly*, May 27, 1974. By the mid-1980s, Western Europe's dependence on imported energy materials may conceivably be reduced to a significant degree. See Peter Odell, *The Availability of Indigenous Energy in Western Europe, 1973-1998, with Special Reference to Oil and Natural Gas*, prepared for the First World Symposium on Energy and Raw Materials, Paris, June 1974.

* One measure of these efforts was the 33-day presence of the Secretary of State in the Middle East in the Spring of 1974, as he strove to bring about a cessation of hostilities in the Golan Heights area. In that time, he arrived 18 times in Tel Aviv, 14 times in Damascus, 2 times each in Cairo and Alexandria, and once each in Amman, Nicosia, and Riyadh.

warfare on this country, and (2) to bring about a process of peaceful accommodation between Israel and her Arab neighbors that would keep Egypt and Saudi Arabia from again joining an anti-American coalition for such warfare. Such opportunities undoubtedly exist. The present Saudi and Egyptian rulers find many economic and political advantages in deals with the U.S. Government and U.S.-based companies. They seek to counterbalance Soviet power in the area and to bolster their regimes against revolutionary movements of Arab nationalist, socialist, or "technocratic" coloration. They fear other Arab states that are associated with such movements and are more open to Soviet influence. These are at least some of their considerations. It may also be that Egypt's direct territorial claims on Israel in the Sinai are more amenable to compromise than Syria's in the North or those of the "Palestinians" on the west bank of the Jordan (or anywhere in Israel), because Egypt's claims involve largely unpopulated terrain with only a few spots of critical interest. It may be that the Saudi king's insistence on a renewed division of Jerusalem will turn out to be expendable. Therefore, both the Saudi and Egyptian governments may continue to be helpful with a U.S.-managed appeasement process in the area.

But those favorable circumstances can only too easily be negated by the enormous difficulties of peacemaking and peacekeeping. The United States does not have an unlimited capacity to induce Israel to make territorial concessions. It is limited by a variety of interests that the United States shares with the Jewish state, by U.S. inability to guarantee Israel's security continually and effectively with U.S. forces, and by the difficulty of extracting such security guarantees from the Arab powers, which so far, at least, have found no better way of articulating their devotion to the "Arab nation" than hostility toward Israel. The objectives for which the various Arab states and political-military organizations are inclined to pursue or resume warfare may prove to lack reasonable limits. If one of them limits its objectives, another may embarrass it with greater belligerence, official or terroristic. The "moderate" leaders' fear for their personal safety from assassins may render them prone to appease and champion the demands of the least reconcilable Arab elements. Interacting with each

other, those factors are likely to regenerate hostilities of one kind or another, here or there, rekindle intransigence on all sides, and create pressures for a renewal of belligerent Arab solidarity vis-à-vis the United States that "moderates" cannot resist. The counterplayers to U.S. diplomacy may appear in different parts of the Arab spectrum, even in Egypt and Saudi Arabia, whose regimes are not immune to changes of heart or personnel. The interaction of difficult negotiations with Syria and Israel during Secretary Kissinger's two-and-a-half week trip in May, apparent Egyptian efforts to moderate Syrian demands, and the bloody terrorist attack at Maalot gave a taste of the virtual unmanageability of Middle East hostilities.

In the background, the Soviet Union is the most important counterplayer. Its evident interest in establishing itself as the arbiter of Middle East affairs and reducing the influence and position of the U.S. government and the Western oil companies in the area make it look for and often find ways to frustrate the American design. It reinforces Arab "maximalists" in the governments and in the Palestinian organizations with diplomatic support and arms supplies, and thus seeks to keep the Arab-Israeli and intra-Arab conflicts alive and the "moderates" from steadily allying themselves with the United States. Amidst occasional manifestations of a joint interest in peacemaking and the cultivation of "detente," the two great powers are continually maneuvering for advantages in the area, intent on spoiling each other's game.*

Beyond the difficulties of bringing a high-priority peacemaking policy in the Middle East to success, some of the costs and risks should at least be noted in passing. They could take the form of foreign aid commitments, not only to one but to several sides in the conflict, that may be difficult to sustain. There is also the hazard that involvement of the highest officials in the day-to-day management of the regional appeasement effort will simply exhaust their energies and constrict their span of attention, leaving other parties (Iran?) and other pressing problems to suffer from neglect or lack of initiative.

* For an analysis of recent experience in this regard, see Abraham S. Becker, *The Superpowers in the Arab-Israel Conflict, 1970-1973*, The Rand Corporation, P-5167, December 1973.

Making a specific diplomatic project the absorbing concern of policy-makers cannot help but lower their attention to other important matters.

In sum, even a great expenditure of U.S. diplomatic resources may not prevent a recurrence of the blackmail scenario of 1973--an exploitation of the U.S. dependence on Arab oil in conjunction with pressures to achieve Arab solidarity through rivalry and turbulence in hostilities with Israel, under the blessing of the Soviet Union. There is no assurance that the new U.S. diplomatic activism in the region, if it can be sustained, will forestall a Saudi embargo more effectively than the pre-1973 aloofness did, especially since the success of the first embargo may make repetition seem inviting. This is not to gainsay the initial achievements of the U.S. peacemaking effort in the spring of 1974.

We shall not speculate in this report on the forms a renewed supply blackmail may take in the future. A great deal will depend on circumstances. Future disruptions of supply may resemble the 1973 embargo in some aspects and differ in others. They may be more selective, with future embargoers able to draw on experiences gained in the last bout, and with their power over oil companies further enhanced. They may be more restrained by conflicts in OPEC, by "hostages" which the acquisition of enormous wealth has forced the Arab rulers to give to the industrial countries, and by U.S. countermeasures that exploit the opportunities then existing. To explore future disruption scenarios and even to "game" future embargo initiatives would appear to be a worthwhile task, but this has to be left to other studies.

V. PRECAUTIONARY IMPORT POLICIES

PRECAUTIONARY ENERGY POLICIES IN GENERAL

The general question we now wish to address is what the United States Government can do in the field of energy policy to keep another Arab oil embargo from striking principally at domestic consumption, or how to minimize its impact on consumption. The more specific question is what preparations U.S. oil import policy can make before the event.

With regard to the general question, this report can only outline the variables that could be acted on. They are listed below. Only the fifth and the sixth--precautionary import policy and counterembargo import policy--will be discussed here in some detail. The variables are:

1. Stimulating domestic output of oil and other forms of energy;
2. Restraining the growth of oil and other energy consumption;
3. Forming emergency stockpiles of oil;
4. Forming a readily available domestic reserve production capacity of oil;
5. Devising a precautionary import policy to limit dependence on Arab oil;
6. Preparing a counterembargo import policy to be activated during an embargo.*

Theoretically, each variable could deflect the pressure of another embargo occurring before the end of the decade away from U.S. consumption and thus from U.S. foreign policy. In practice, each presents such economic, social, and political difficulties that none of the variables can be expected to carry the burden alone. Our analysis of output expansion and of slower growth in consumption in Sec. IV

* A seventh variable, which might be called "reducing the embargo propensity of Arab rulers," falls largely in the realm of political and financial diplomacy and will not be discussed in this section, which dwells on energy policy.

concluded that those two variables, even on the most optimistic assumptions, are not likely to diminish U.S. dependence on Arab oil significantly in the years immediately ahead. In fact, that dependence may well increase temporarily. A lower rate of growth in consumption in response to both higher energy prices and regulatory constraints would also reduce the leeway for relatively painless consumption restraints of the sort imposed at the beginning of the last embargo. Other measures would thus be necessary to reduce the risk.

EMERGENCY STOCKS AND DOMESTIC RESERVE PRODUCTION CAPACITY

Standby emergency supplies of petroleum have been repeatedly proposed as a way to assure reliability of supply. Unlike the Western European countries and Japan, the United States does not have emergency petroleum stocks. Current stocks are only working inventories, a carry-over from the years when imports were limited and major interruptions in supply were not a problem.

The desired level of emergency stocks would depend among other things on the severity of interruption anticipated, the extent to which it should be covered, and how long it is expected to last. It would not be necessary for the chosen level to cover cessation of all imports; an embargo by all countries that export to the United States would be extremely unlikely, given their heterogeneity. A more reasonable level would envisage an embargo by the OAPC countries. This would cover lesser interruptions as well. Since some of the expected interruption could be handled by emergency demand reductions, emergency stocks would not have to cover the entire amount of a maximum interruption; a level between 70 to 90 percent might be judged sufficient. The three most widely mentioned anticipated durations of interruptions are three months, six months, and twelve months.* (The recent embargo lasted roughly five months.) The choice among these three involves a direct tradeoff between risk avoidance and cost. Large stockpiles provide more insurance;

* National Petroleum Council, *Emergency Preparedness for Interruption of Petroleum Imports into the United States*, July 1973, p. 5, and MIT Energy Laboratory, Policy Study Group, "Energy Self-Sufficiency: An Economic Evaluation," *Technology Review*, May 1974.

they also cost more. Given the constraints on stockpile expansion, which we shall discuss presently, a three- to six-month stockpile might be a realistic current goal. Assuming 500 million barrels annually of direct and indirect OAPEC imports, 80 percent coverage for three to six months would translate to a stockpile of 100 to 200 million barrels. Higher OAPEC imports resulting from less successful efforts toward independence than those assumed in the previous section, and consequently higher risks, would suggest a higher level.

Two types of storage are available: above-ground steel tank storage and underground salt dome storage. The choice depends on considerations of cost, convenience, and availability. Estimated capital costs for steel tankage range from \$2.50 to \$5.00 per barrel of capacity; estimated construction costs for salt dome storage range from \$0.40 to \$1.00 per barrel. Capital costs for a 100 to 200 million barrel capacity might thus range from \$40 million to \$1 billion. The less expensive salt dome storage is also less convenient, all available locations being confined to the Texas-Louisiana-Mississippi coastal area. Steel tanks are the only recourse for the East and West Coasts, the current destinations of most petroleum imports. Given potential transportation limitations, probably no more than half the emergency stockpile should be in salt dome storage. If fresh water is available for leaching the cavities and if disposal of the resulting brine in the Gulf of Mexico is permitted, two salt dome storage facilities with a capacity of 50 million barrels each could be finished within 30 months after construction began. Construction of steel tanks would be more constrained. About 3000 tons of steel are required per million barrels of storage capacity. The existing total annual capacity of the steel plate fabrication industry for tankage is now roughly equal to the steel plate required for 100 million barrels of capacity.* Given the heavy demands for steel for other uses (including energy production and conversion) and the lack of excess production capacity in the steel industry, the rate of emergency tankage construction could probably be no more than

* Both the NPC and MIT studies discuss tankage costs. The NPC study also examines steel plate availability, salt dome storage costs, locations, and construction periods.

10 to 20 million barrels per year for some years to come. That would be a severe constraint for a program aiming at protection in the years immediately ahead.

The oil to fill this storage capacity, once constructed, could come from two sources: the international oil market or Naval Petroleum Reserve #1 (Elk Hills). If an oil glut resulting in price declines were to occur, imports would be the most desirable source; but the imposition of production restrictions by the exporting countries could forestall that possibility. In the absence of a great easing of the import situation, importing large amounts of oil for stockpiling might imply unacceptable restraints on consumption.

Alternatively, the Elk Hills reserve might be exploited for the purpose. Given its existing reserves, Elk Hills could maintain an annual production rate of 50 million barrels for at least eight years, more than enough time to provide oil for emergency storage either directly or through swap arrangements. Using the reserve for this purpose would, however, require (1) amendments to existing legislation to define production for emergency storage as a national defense purpose, (2) redrawing the existing unit contract between the Navy and Standard Oil of California, (3) development drilling within the field, (4) additional surface facilities, and (5) construction of additional connecting pipelines and some augmentation of existing trunkline capacity from the San Joaquin Valley to Los Angeles and the San Francisco Bay Area.

In sum, while emergency storage is a desirable way of insuring reliability of supply at a reasonable financial cost, it appears unlikely that a significant storage capacity in the desired locations could be created and filled in the next three to four years. For at least that period, emergency stockpiling offers only a partial insurance, at best.

Developing a substantial stand-by production capability, such as the United States had prior to 1970, would under present circumstances be a counterproductive policy. Developing new or earmarking current production capacity for emergency purposes would reduce domestic production and increase U.S. dependence on imports from less reliable

sources, precisely the course that ought to be avoided. Some excess production capacity could be provided, however, for a relatively low investment cost. With some expansion of existing facilities, Naval Petroleum Reserve #1 would provide a reasonable emergency capability on the West Coast. For the rest of the decade, some of the giant Texas fields will also continue to have some excess production capability that could be rendered usable with little additional investment. But those and other low-cost options that may be available would provide little more than 500,000 barrels per day of emergency capacity.

For the purpose of the following discussion, we must assume that neither a stockpile program nor development of reserve production capacity will diminish significantly the vulnerability of the United States to supply interruptions until 1980.

PRECAUTIONARY IMPORT DIVERSIFICATION

The objective of a precautionary import policy would be to increase the share of U.S. oil imports from non-Arab sources during the remaining years of this decade. That objective would oblige the government to articulate a preference for the development of oil imports from Western Hemisphere and non-Arab Eastern Hemisphere sources within the frame of a policy that seeks to keep total oil imports in bounds, say, to the degree envisaged in Sec. IV. The precautionary import policy would therefore aim at further source diversification, not at great import increases from any source.

Such a policy raises several questions. (1) Would it be compatible with a U.S. policy of inducing Arab countries to make increasing oil supplies available for export and to maintain the flow of these exports? (2) Would it sacrifice cheap sources of supply? (3) What other sources should be favored for imports into the United States? (4) What obstacles stand in the way of obtaining greater, at least not smaller, imports from them, and how could such obstacles be overcome? (5) How should preference be articulated?

(1) Superficially, a U.S. policy of holding down imports of Arab oil seems to conflict with the policy that seeks to enlist Arab countries, particularly Saudi Arabia, in expanding oil exports. Given the

possibilities for expanding oil output in the area in the near future, the latter policy is an attractive answer to growing oil demands and rising oil prices the world over; in addition, it is likely to strengthen the position of oil companies that have producing assets or seek to maintain preferential access to output in the Arab countries. But there will be no conflict if Saudi exports expand in the directions in which they have chiefly gone in recent years, i.e., to non-U.S. destinations. According to Aramco's annual report for 1973, only 5 percent of the combine's crude and product exports went to North America; 52 percent went to Europe, 29 percent to Asia, and 14 percent elsewhere.* (See also Table 7 below.) Holding down U.S. imports of Saudi oil would not be incompatible with increases of total Saudi exports, provided that the non-U.S. markets can absorb the bulk of these exports as they did in the past. If Aramco's American parent companies and other U.S.-based companies that now seem to be getting involved in Saudi oil exports (e.g., Gulf) attend to the opportunities in these traditional markets, their interests need not suffer from nonexpansion of the American market for Saudi oil. The important point is that no need for the *U.S. market* to absorb increasing quantities of Saudi oil should be derived from the U.S. interests in keeping ample Saudi oil supplies flowing into the *world market* and maintaining an important role for U.S.-based companies in managing that flow. The precautionary import policy for the United States need not damage those interests. It would be consistent with this policy to encourage evident tendencies in Western Europe, Japan, and elsewhere to cover a substantial portion of their oil imports from Saudi Arabia and other Arab sources.

(2) But would such a policy not signify reliance of U.S. consumers on higher-priced oil? Saudi oil is often regarded as cheap in comparison with oil from other sources. If it were, the U.S. consumer might forgo a price advantage. But the only thing that is predictably cheap about Saudi oil is its marginal cost of production. This has been relevant to the operating companies for as long as Saudi government charges

* *Aramco 1973, Annual Report*, p. 7. In 1973, only 12 percent of all Arab oil shipments went to the entire Western Hemisphere. *B.P. Statistical Review of the World Oil Industry*, 1973.

Table 7

OIL EXPORTS OF OPEC MEMBER COUNTRIES TO SELECTED DESTINATIONS, 1972
(In thousand b/d and percent of total)

Exporting Country and Form of Exports	Direct Export Destination									
	U.S.	Canada	Carib- bean	U.K.	France	FRG	Neth.	Italy	All Western Europe	All Destina- tions ^a
Saudi Arabia, c, r	213 4	49 1	84 1	497 8	556 9	190 3	730 12	634 11	3107 52	969 16
Kuwait, c, r	42 1	-- --	-- --	507 16	340 11	88 3	302 10	274 9	1694 54	709 23
Abu Dhabi, Qatar, c	117 8	33 2	-- --	241 16	265 17	48 3	202 13	100 7	917 60	269 18
Iraq, c	18 1	1 0.07	-- --	74 5	213 15	27 2	27 2	205 14	743 52	5 0
Libya, c	174 8	35 2	184 8	300 14	196 9	553 25	104 5	442 20	1739 79	7 0
Algeria, c	82 8	-- --	-- --	21 2	320 32	200 20	33 3	76 7	829 83	-- --
Iran, c, r	190 4	46 1	NA --	694 14	163 3	30 0.6	180 4	161 3	1414 29	1677 35
Indonesia, c	160 20	-- --	54 7	-- --	-- --	-- --	-- --	5 0.6	26.5 3	566 70
Nigeria, c	422 24	36 2	87 5	323 19	285 16	73 4	208 12	78 4	1080 62	77 4
Venezuela, c, r	1496 49	416 13	445 14	134 4	51 2	38 1	20 0.6	33 1	374 12	10 0

SOURCE: Organization of Petroleum Exporting Countries, *Annual Statistical Bulletin 1972*, Vienna, June 1973.

NOTE: c = crude oil; r = refined products.

^a Includes total exports of the country including bunkers. Includes destinations not shown in table.

did not bring up tax-paid costs or buy-back prices to OPEC-wide levels; but to the extent that the companies previously siphoned off the rent, it has not been relevant to the U.S. consumer. In the future, the marginal production cost advantage promises to be irrelevant for the companies as well, because the rent it affords can be expected to be siphoned off completely by the Saudi state and buy-back prices can be expected to be more or less in line with prices elsewhere. Saudi oil may exercise a price-depressing effect on worldwide oil prices, and therefore U.S. oil import prices, by its abundance on the market, *if the Saudi government chooses to make it abundant*. It will not as a rule be cheap to the U.S. consumer by being imported in the place of, say, Nigerian, Indonesian, or Iranian oil. This rule might become invalid if bilateral deals were made between the United States and Saudi Arabia, or another producer country, that fixed systematically lower, preferential, delivered prices to the United States than from other sources. But agreements of such a kind are unlikely.

As long as the OPEC cartel holds together, marginal production cost before producer government levies will be completely irrelevant to the prices at which crude oil can be lifted from various sources.* OPEC itself will work for price uniformity; market conditions and price manipulation by particular governments will cause unpredictable variations in the actual constellation of crude prices. Profession of individual producer government preferences--say, of the Iranians for "high," the Saudis for "low" prices--will not furnish any reliable criteria for determining whose oil will be cheap in days to come, and whose expensive. Therefore, a precautionary U.S. import policy, leaning toward import preference for relatively secure sources over others, cannot be faulted by an assertion that it will necessarily lead to higher import prices. It should not stand in the way of oil importers, however, to get whatever is the cheapest oil on the market, from any particular source at any particular time.

If the OPEC cartel should break up and producer countries begin

* *The Economist* of May 11, 1974 noted that marginal production cost is presently about one-fortieth of "the free-market price" of crude oil.

to undercut each other and compete for larger market shares, an entirely new situation would arise. Such a situation would have to be closely examined to see whether pursuit of the precautionary import policy would expose U.S. oil consumers to systematic price disadvantages. At the present time, the breakup does not appear imminent--the OPEC partners still seem to be able to strike compromises--and even if one allows that it might occur, there is no assurance that a price war would be more than a brief interlude followed by the reconstitution of cartel discipline.

(3) The sources to be favored by the precautionary import policy would be Western Hemisphere sources, such as Canada, Venezuela, and Ecuador, and non-Arab Eastern Hemisphere sources, such as Indonesia, Nigeria, and Iran--that is, countries that have been supplying the bulk of U.S. crude and product imports in recent times (84 percent in January through October 1973). As can be seen in Table 7, Venezuela, Nigeria, and Indonesia (but not Iran) already send far higher proportions of their total exports to the United States than do the Arab countries. While the estimated petroleum reserves in those countries are dwarfed by those in the Arab countries (see Table 8), this fact by itself is irrelevant to the pursuit of a moderate expansion of U.S. imports from non-Arab sources. It could become relevant only to efforts to raise U.S. aggregate oil imports greatly and progressively, with which we are not concerned here. There are, however, two classes of difficulties for such a moderate expansion that need to be considered: country restraints on exports, and competing import demands.

(4) As Sec. IV has pointed out, several of the countries to be favored under the precautionary import policy promise to be resistant to U.S. efforts to increase imports, or even to maintain them at recent levels. This appears to be least of a problem in Nigeria and Indonesia, whose expanding production in recent years has gone increasingly into exports to the United States. (See Fig. 15 above.) To judge from these trends, industry dispositions in those two countries seem already well attuned to the development that U.S. precautionary import policy should favor, and perhaps all that remains to be done there is to see to it that nothing interferes with a further

Tab. 8

OIL RESERVES AND PRODUCTION IN SELECTED AREAS

Country	Estimated Reserves (billion barrels)		Crude Oil Production (million b/d)	
	1958 ^a	1971 ^b	1971 ^c	Percent Increase to June 1973 ^d
Saudi Arabia	48	157	4.8	+58
Kuwait	61	78	3.2	-9
Emirates	2	20	1.7	+35
Iraq	22	36	1.7	+18
Libya	--	>25	2.8	-18
Algeria	1	12	0.8	+38
Iran	32	55	4.6	+26
Indonesia	8	10	0.9	+34
Nigeria	--	12	1.5	+33
Venezuela	15	14	3.6	-6
Canada	3	>10	1.6	+19

^aDe Golyer and McNaughton, *Twentieth Century Petroleum Statistics 1959*, Dallas, Texas, 1959.

^bJohn P. Albers et al., *Summary Petroleum and Selected Mineral Statistics*, Geological Survey Professional Paper 817, Washington, D.C., 1973.

^cB. P. *Statistical Review of the World Oil Industry*, 1972, London, 1973.

^d*Oil and Gas Journal*, August 20, 1973.

growth of Nigerian and Indonesian exports to this country during this decade (see below).

Canada, as we have seen, presents a less happy picture for future oil imports into the United States. A decline in Canadian oil exports seems inevitable. Its timing and extent are still unsettled, however, and may be amenable to U.S. influence. Interprovincial Canadian differences on economic and political grounds may retard or limit the oil diversion program. So may the capacity of the interprovincial pipeline. Bargaining points for the U.S. interest in continuing substantial Canadian exports could be the fact that the interprovincial pipeline

passes through U.S. territory, as well as the substantial dependence of Eastern Canada on coal and coke imported from the United States (in BTU terms equivalent to 25 percent of oil exports to the U.S.). But it must also be noted that Canada has a further bargaining point in its natural gas exports to the United States.

Likewise, the oil import picture from *Venezuela* is rather cloudy. Any increase of Venezuelan oil exports in the next few years is rendered doubtful by government policies that reflect the decline in proven reserves during the last decade, and the government's intention to conserve the remaining conventional oil resources for domestic industrialization. The Venezuelan government appears intent on making future export increases depend on the development of the Orinoco Heavy Oil Belt, an eventuality beclouded by its high costs on the one hand and Venezuela's oil nationalization policy on the other. It seems rather doubtful that U.S. Government inducements to such development, which apparently were offered in 1973, can instigate a more forthcoming Venezuelan export policy, and whether that would reverse the prospect of gradually declining oil exports to this country in the next few years.

Iran offers slightly more hope from our point of view than do Canada and Venezuela. It has pressing revenue requirements for internal development and armament. But it can obtain the necessary revenues either by increasing production or by seeking to maintain or to increase its revenue per barrel. If it attains its current planned levels of production, it offers some opportunities for increased exports. Its total oil exports have been increasing steadily, from 3.2 million b/d in 1969 to 4.8 million b/d in 1972. The share going to the United States, which was less than two percent in 1969 and 1970, advanced to at least four percent in 1972 and probably more in 1973. The nationalization issue appears to be out of the way in Iran, and the Shah's political and military interests, notably his avid desire for U.S. arms, are likely to be a factor favoring to some degree the flow of Iranian oil to the United States.

Unfavorable factors, besides the noted limitations of productive capacity, consist largely of the competing demands for Iranian crude

oil. Iran's industrial development policy, which provides a motive for maintaining oil production, also entails a policy of maximizing domestic refining and domestic utilization of oil as a raw material rather than as a fuel, e.g., in a petrochemical industry. This policy works toward a replacement of crude oil exports by product exports, and of all oil exports by domestic consumption of oil. Its effects could be observed recently in Iran's turning down Belgian and West German efforts to increase Iranian crude supplies to European refineries, and its emphasis on domestic refinery construction and petrochemical industry development in the cooperation deals with Germany. Competing internal demand is likely to combine with Iran's evident pressure for higher oil export prices to limit Iranian crude oil exports to the United States.

This brings us to the matter of *oil import demands of other countries* that will compete with future U.S. demand. The issue is relevant for Iran and several of the producer countries discussed above. In both Iran and Indonesia, efforts to bring about increases, even moderate ones, of exports to the United States are bound to run into heavy competition from Europe and Japan. In Iran, this competition may be enhanced to some degree by the strong position of Europe-based companies with commitments to their European refineries and other customers (Table 9). This is not the case in Indonesia; U.S.-based companies prevail there, and the main question is to what extent they will emphasize the flow of oil to the United States (West Coast) over that to Japanese buyers.* In the near future, the pressure from these buyers is likely to be great, and neither the U.S. Government nor the U.S.-based companies have shown an interest so far in stimulating Iranian oil exports to this country commensurate with European and Japanese initiatives.

* It should not be assumed, of course, that ownership or otherwise preferential access of U.S.-based companies to a country's oil supply is tantamount to ready availability of the oil for U.S. imports. The major U.S. companies in Iran habitually direct a large part of their oil exports to their refineries in Europe and to contract customers in Europe and Japan.

Table 9

PERSIAN GULF AND OTHER OPEC CRUDE OIL PRODUCTION,
BY COUNTRY AND OPERATING COMPANY, 1972
(In thousand b/d)

Company	OPEC Country												Company OPEC Total
	Iran	Iraq	Kuwait	Saudi Arabia	Abu Dhabi	Qatar	Total Persian Gulf	Algeria	Libya	Nigeria	Indo- nesia	Vene- zuela	
U.S.-based major companies													
Exxon	318	80	--	1720	72	29	2219	--	308	--	37	1486	4050
Gulf	318	--	1569	--	--	--	1887	--	--	325	--	197	2409
Texaco	318	--	--	1720	--	--	2038	--	117	5	415	99	2674
StanCal	318	--	--	1720	--	--	2038	--	117	5	415	39	2614
Mobil	318	80	--	573	72	29	1072	--	106	166	37	96	1477
Total	1590	160	1569	5733	144	58	9254	--	648	501	904	1917	13224
Foreign companies other than U.S. majors ^a													
Shell	635	161	--	--	145	298	1239	--	133	604	--	901	2877
British Petroleum	1816	161	1430	--	439	57	3903	--	--	603	--	--	4506
CFP	272	161	--	--	292	57	782	144	--	--	--	--	926
Other, nonlocal	461	34	243	239	30	12	1019	101	1378	108	--	341	2947
Total	3184	517	1673	239	906	424	6943	245	1511	1315	--	1242	11256
Gov't or nat'l company	249	789	41	41	--	--	1120	817	80	--	175	61	2253
Total, all companies	5023	1466	3283	6013	1050	482	17317	1062	2239	1816	1079	3220	26733

SOURCE: Organization of the Petroleum Exporting Countries, *Annual Statistical Bulletin 1972*, Vienna, June 1973.

^aIncludes a variety of U.S. companies.

The competitive situation for a growth of U.S. imports may be somewhat more favorable in Nigeria, since the U.S.-based companies (chiefly Gulf), which in 1972 produced 28 percent of Nigerian oil, are more attuned there to supplying the U.S. market than are those operating in the Middle East. As for the dispositions of the two British majors, which produced two-thirds of Nigerian oil in 1972, a great deal may depend on the speed with which North Sea oil will enter into the U.K. market. The sooner and more copiously it comes in, the more interested Shell and British Petroleum may be in shifting some of their exports to other destinations, perhaps including the U.S. East Coast. But continental Western Europe will continue to draw heavily on Nigerian oil, notably France through the operations of its government company, ELF-ERAP.

Competing import demand from other countries will present the least obstacle to U.S. imports from Canada and Venezuela--from Canada because exports to non-U.S. destinations (e.g., Japan) are neither customary nor likely to fit into the future picture, and from Venezuela for similar reasons albeit to a lesser degree. To the extent that Canada succeeds in replacing East Coast imports (now principally of Venezuelan oil) with West Canadian supplies, it may indeed "free" some Venezuelan supplies for the United States.

The composite picture is complex, then, with regard to stepping up imports from these non-Arab countries in the near future. The three countries with the potentially greatest capacities for aggregate export growth (Indonesia, Nigeria, and perhaps Iran) are also the countries whose oil is keenly coveted elsewhere, at least in the near term. The two that are most "attached" to the U.S. market (Canada and Venezuela) show little capacity and inclination for export growth. This complexity suggests that U.S. Government efforts to stimulate a greater proportion of imports from that group of countries relative to imports of Arab oil have to take very different situations into account.*

* This discussion of import possibilities from non-Arab sources has been limited to countries that have been significant suppliers of oil to the United States in the past. Countries that have not been

(5) How should U.S. preference for imports from non-Arab countries be articulated? Discriminatory tariff, tax, or country quota arrangements come to mind first as means by which oil purchases from politically insecure sources could be discouraged. But formal discrimination against imports from Arab sources and in favor of other sources appears inadvisable on several grounds. First, differential tariffs or quotas would conflict with a general precept of U.S. commercial policy, the most-favored-nation principle. Second, such formal discrimination would not combine well with the policy of developing cooperative relations with the Arab countries even if it is understood, as we suggest, that such relations should not involve an increased flow of Arab oil to the national market. Third, formal discrimination would be impossible to administer to the refined product imports from Europe and the Caribbean area, which can be derived from Arab and non-Arab oil. Fourth, it probably would not help stimulate Venezuelan and Canadian oil flows to this country. Fifth, a discriminatory tariff might not benefit the U.S. oil consumer because it might simply lead to differential rents for the government agencies of these countries or the international companies operating in them.

Imports of Nigerian, Indonesian, Iranian, and perhaps some other countries' oil might perhaps be stimulated by tariff preferences. But the general arguments noted above would still speak against this course. U.S. preference should be articulated in other ways.

The principal course we wish to draw attention to may be summed up as *nudging certain producing countries and companies to increase the flow of non-Arab oil to the U.S. market*, and encouraging that flow

may become so in the future. One of particular interest might be *Norway*, which is on its way to becoming an important oil exporter. American-based companies play an active role in this development, which is closely supervised by the Norwegian government; and a variety of convergent U.S.-Norwegian interests and of Norwegian demands that the United States might be able to satisfy offer fruitful opportunities for bargaining for these oil supplies. But since it is uncertain how soon significant Norwegian exports will become available, we shall not discuss this prospect as a feature of the normal flow of oil over the next few years, and rather deal with it under the head of emergency supply arrangements in the following subsection.

by *incidental market opening measures*. The governments of Indonesia, Nigeria, and Iran, for example, could be stimulated in that direction by correlating the U.S. interest with their demand for development assistance or, notably in the case of Iran, for arms assistance. The U.S.-based companies could be stimulated by expressing government interest in the countries' development, favoring investments serving it, and encouraging longer-term contracts for oil from those sources while discouraging such contracts for other sources. It should be realized that in some situations, e.g., the Nigerian, such efforts would simply amount to going with the trend and helping it along. In other situations, efforts need to be made to keep a generally favorable supply development from running into predictable obstacles. For example, an increasing flow of Indonesian oil to the West Coast may, by 1978, run into heavy competition with Alaskan oil. Rather than permit such a regional glut to develop and to lead to a greater diversion of Indonesian (or Alaskan) oil to Japan, the U.S. Government should encourage construction of a pipeline from the West Coast over the Rocky Mountains that could carry Alaskan or Indonesian oil to other parts of the country. Such a pipeline has been under consideration for some time. Rights of way are available, and construction need not take much time. This would be an important market opening measure.

Adoption of an emergency stockpiling program would equip the U.S. Government with another instrument to use in articulating its preference for oil from favored sources. The stockpile authority could seek supplies from them in the first place. This is at least an inviting possibility where other considerations (price, cooperation agreements, etc.) do not favor recourse to Arab oil for this purpose.

With regard to Canada and Venezuela, the nudging policy cannot be expected to increase exports to the United States. But it might be possible, particularly with Canada, to negotiate successfully for a delay of the reduction process, so as to stabilize U.S. imports from those countries over the next three to five years. We cannot, however, go here into the possible quid pro quos that the United States might offer to these hemispheric partners.

Throughout this discussion of ways to emphasize U.S. imports from

non-Arab sources in the years ahead, one should keep in mind that this objective need not conflict with efforts to sustain the role of the U.S.-based companies as concessionnaires or offtakers of Arab oil and as its distributors outside the United States. As mentioned, that has been the chief traditional function of U.S.-based company operations in the Arab oil countries. Precautionary U.S. import policy would not impede that function, but it would oppose its transformation into supplying the U.S. market. Such abstention would also accord with European and Japanese supply interests and tend to enhance the position of the U.S.-based companies supplying those markets from Arab sources. Conflict with European and Japanese supply interests would have to be expected, however, where they and the U.S. market compete for other overseas sources.

The foregoing ideas for a precautionary U.S. import policy are offered as possible guides for "nudging" the composition of imports in a certain direction, not for reaching a certain target composition of U.S. imports by source at a certain time. Formulation of such a target would not make much sense at this time. There are too many uncertainties in the development of the petroleum market, national policies in the various countries, and international relations. To attempt to fix a maximum for imports of Arab oil in a certain time span, or a minimum of imports from certain non-Arab sources, would give artificial rigidity to a precautionary import policy and might make it impractical. What seems most desirable is to introduce into government attitudes--whether articulated in direct government purchases or in guidance to the oil companies from the FEA, the State Department, or elsewhere--a consideration favoring oil flows from non-Arab sources in the years ahead, reinforcing market tendencies that go in that direction, and cautioning or restraining tendencies that go in the opposite direction. That is what the term "nudging" is meant to convey.

Like stockpiling, a precautionary U.S. import policy of this kind could reconcile a continued reliance of the U.S. market on imports, albeit at a restrained total level--and thus avoidance of the cost of oil autarky--with a greater measure of security from politically inspired supply disruptions.

PREPARATIONS FOR A FUTURE COUNTEREMBARGO IMPORT POLICY

Should an Arab oil embargo on the United States recur in the next five years, the U.S. Government may want to follow a more active counter-embargo import policy than it did in 1973-1974. The political and economic, international and domestic configuration of such a crisis cannot be predicted in detail, and it is by no means certain that the government would do any more than it did in the last embargo to assure a quick replacement of interrupted oil-import streams with imports from other sources. But assuming it would want to have that option, it could take various preparatory measures.

Some fall in the field of domestic institutional rearrangements. It would be desirable to institute an emergency consultation and organization mechanism, involving government agencies and oil companies, empowered to deal with international oil-flow rearrangements in favor of the domestic market (i.e., not only in favor of the markets of allied countries). Such a mechanism would be an institutional adaptation to the fact that the United States no longer is--and for the rest of this decade will not be--a residual supplier of oil to other countries in a Middle East oil crisis. It would be a recognition that the United States is now itself interested in substitute supplies during such a crisis.

Other arrangements might be made on the international plane. Regardless of how oil imports from non-Arab countries may develop in the years ahead, the United States might want to explore in the immediate future the possibility of agreements with such countries to step up supplies from them during an embargo, on short notice. The purpose of such *emergency supply agreements* would be to develop a readily available reserve supply capacity in friendly foreign countries for the protection of the U.S. market.

Our preceding discussion of oil import prospects from certain non-Arab countries has pointed out that some of them, notably Canada and Venezuela, are likely to limit oil exports to the United States in the years ahead precisely because they want to husband what presently appear to be limited or declining reserves. That consideration, among others, might render them unreceptive to U.S. proposals for emergency

supply agreements. It appears that Canada refused to enter into bilateral discussions with the United States about such an agreement in 1973, and expressed its preference for multilateral sharing. But with the multilateral discussions shifting from supply-sharing to coordinated domestic arrangements of the "consumer" countries, the U.S. may wish to try again to discuss the matter bilaterally with Canada. It may also be profitable to do so with Venezuela, which has already limited production to less than existing productive capacity, and above all with Nigeria and Indonesia, which have shown no intention to limit exports.

Since such proposals would not be concerned with the steady state of the oil trade, but only with a temporary augmentation of the oil trade during an emergency--say, six to twelve months--the distinction between reserve-limited and growing-reserve countries may not be as critical as it is for the steady state. One might even envisage that a temporary supply augmentation from a reserve-limited country could be agreed to with the provision that the United States would undertake to return (sell back) equivalent amounts of oil to the country after the emergency, under a kind of "lend-lease" system.

The ideal partner for an emergency supply agreement would be a non-Arab oil producing country that follows a deliberate policy of holding back current output in the face of relatively large or growing reserves. It seems that Norway presently fits this description. One of the declared purposes of Norwegian oil policy is to restrain the extraction, even the exploration, of the considerable offshore oil pools under its jurisdiction so as to "adhere to a moderate pace of extraction of the petroleum resources."* The objective is evidently not to delay the achievement of national oil self-sufficiency, indeed of a respectable export capacity, but to avoid the economic and social dislocation, and the political problems, that would attend too fast and massive a growth. Development of a reserve capacity that would be explicitly earmarked for emergency use, and would not be available for

* Royal Norwegian Ministry of Finance, *Petroleum Industry in Norwegian Society*, Parliamentary Report No. 25, Oslo, February 15, 1974, p. 16x and passim.

routine exploitation over a finite span of years, might well fit into Norwegian policy. This would be particularly relevant to oil reserves outside the so-called "communal" fields, where Norway is free to regulate exploitation without running the risk that the pools would be emptied from the British side if pumping were held back on the Norwegian side.

In the Norwegian case and in those of the aforementioned countries that might be considered for the purpose, the problem will be what quid pro quos the United States might offer for measures that would permit and assure a short-run step-up of oil exports to the United States, particularly if maintaining a corresponding excess capacity proves to be expensive. The measures themselves would have to be government and company dispositions designed to generate, in an emergency, a supplementary flow from operating or shut-in wells for export to the United States. The quid pro quos would have to be selected from relevant lists of desiderata that vary from country to country. Neither one of these two subjects can be pursued properly within the framework of the present study. But if the general idea suggested here should find interest, specific studies should be undertaken promptly to assist in the preparation of eventual initiatives.

The principal argument advanced in this report is that a precautionary oil import policy in anticipation of future Arab embargo threats should encompass measures influencing the origin of imports in the years ahead (the "steady state") as well as measures aimed at substituting other imported oil for oil that would be withheld during a future embargo.

VI. U.S. EMBARGO IMMUNITY AS AN ALLIANCE STRATEGY

Precautionary U.S. import (and stockpile) policies have been explored in this report as a means to lift the threat of politically inspired disruptions from the U.S. oil supply and thus to immunize U.S. foreign policy against the play of "threats and promises" by the Saudi and other Arab governments. Our analysis has focused on the direct linkage that U.S. reliance on Arab oil forms between Arab will and U.S. action, or, one may say, on a strictly bilateral scenario of deterrence or blackmail.

This scenario does not do full justice to the way in which the embargo and export curtailments of 1973 were designed to operate, and in which a future supply disruption may be designed to operate. The 1973 measures sought to influence the United States not only by completely blocking its own imports of Arab oil and inflicting distress on its domestic economy, but also by imposing a graduated series of blocks on West European and Japanese imports of Arab oil and thus distressing their economies. Western Europe and Japan were thereupon expected to press hard on the United States for relief, and the United States to alter its policy correspondingly, out of concern for its alliance relationships (foreign policy solidarity) with those countries and U.S. economic interests there. Undoubtedly, the Arab oil weapon worked on the United States by this indirect route as well, although it is impossible to say how strong its effect would have been in the absence of the direct link.

Precautionary U.S. oil import policies do not seem to block that triangular blackmail mechanism. By themselves they do nothing to relieve Western Europe's and Japan's dependence on Arab oil. In fact, if those governments wish to maintain or increase their dependence on Arab oil, as some of them have shown signs of doing, their actions may, as has been pointed out above, tend to facilitate a precautionary U.S. import policy, and the U.S. Government may find little profit in trying to dissuade them from such a course. During the 1973 crisis, the allied governments went to great lengths to appease the Arab rulers, to

dissociate themselves from U.S. positions in the Middle East conflict, and, in the case of the Europeans, even to distance themselves from the less compliant members of the European Community whom the Arabs put under embargo. It is for the sovereign West European and Japanese governments to draw the lessons from this experience.

Our analysis has proceeded on the assumption that it is within the power of the U.S. Government to immunize the U.S. domestic economy substantially against a renewed withholding of Arab oil. We cannot assume, however, that the U.S. Government can do the same for the economy of the non-Communist world as a whole, or for Western Europe and Japan in particular. Washington can exhort those governments to pursue policies of consumption restraint and devise alternative energy supply policies, and perhaps can facilitate some of their moves in those directions. But it cannot guide their hands as they make the difficult choices confronting them. The alliance relationships are not of a kind that would permit that. Variations of "Project Independence" are basically national responsibilities in the non-Communist world as it is today.

But in one important respect precautionary U.S. policies of the kind discussed in this report can be a realistic and profitable alliance strategy. By losing its reserve supply capacity and permitting itself to become dependent on petroleum imports from politically insecure sources in the early 1970s, the United States jeopardized not only its economic and political security, but also its position in the European and Asian alliances. It began to compete with its allies for Middle East oil and it deprived them of the American oil they had fallen back on in earlier Middle East crises, thus measurably increasing the exposure of all the allies, including the United States, to price and supply blackmail. This was a justified European complaint in the year preceding the October crisis. The United States can refortify its alliances by turning now to a policy of import moderation and a precautionary import policy. While it would not be able to reconstitute a comfortable domestic reserve supply capacity for its European and Asian allies in the next few years, it might at least create an *amplified emergency* capacity of this sort. That is, it could provide a greater

margin of secure supply and make it available to threatened allies through tolerable cuts in U.S. consumption. Thus an import policy reducing the United States' own exposure to Arab oil blackmail can also work as a positive alliance strategy.

Appendix A

MONTHLY U.S. OIL IMPORTS, CRUDE AND PRODUCTS,
DURING THE ARAB EMBARGO, 1973-74

(In thousand barrels/day)

Country of Shipment Origin	1973			1974		
	Oct	Nov	Dec	Jan	Feb	Mar
Arab countries						
Algeria	147	62	1	--	3	8
Bahrein	19	18	3	--	--	--
Egypt	25	--	--	--	--	--
Iraq	12	--	--	--	--	--
Kuwait	56	63	--	--	--	--
Libya	203	138	24	1	17	5
Oman	1	--	--	--	1	2
Qatar	18	9	2	--	--	--
Saudi Arabia	788	635	196	21	39	86
United Arab Emirates	62	107	--	10	--	--
Yemen	5	2	1	--	--	4
Total, Arab countries	1336	1035	228	32	59	103
Non-Arab countries						
Canada	1240	1303	1137	1180	1177	1111
Venezuela	1086	1336	1365	1093	1125	1102
Bahamas	119	194	165	136	174	176
Trinidad	205	291	210	219	185	195
Virgin Islands	335	368	408	424	350	291
Netherlands Antilles	543	608	618	664	632	512
Nigeria	516	448	535	466	357	549
Indonesia	181	206	270	172	419	265
Iran	250	254	447	457	334	381
Italy	135	182	70	91	112	104
Netherlands	80	80	85	48	83	89
Total, non-Arab countries (listed and unlisted)	5189	5829	5718	5323	5162	5112
Total, all countries	6525	6864	5945	5355	5221	5215

SOURCE: U.S. Bureau of Mines. (See App. B.)

Preceding page blank

Appendix B

SOURCES AND CHARACTERISTICS OF DATA

Data from the U.S. Bureau of Mines were used as the primary source of statistics for this report, largely because of their comprehensiveness and consistency over time. The two basic sources were its annual *Minerals Yearbook* and the *Annual Petroleum Statement*. USBM data on U.S. production of crude oil, lease condensate, and natural gas liquids were checked with similar estimates by the American Gas Association and the American Petroleum Institute in their annual *Reserves of Crude Oil, Natural Gas Liquids, and Natural Gas in the United States and Canada and United States Productive Capacity*, and by the U.S. Geological Survey in *Summary Petroleum and Selected Mineral Statistics for 120 Countries, Including Offshore Areas* (Professional Paper 817). In no year did the totals diverge more than one percent from one source to another; in many years the totals were identical; the average difference was around 0.2 to 0.3 percent. Because of a difference in definition, the USEM and AGA/API data on the breakdown between crude oil/lease condensate and natural gas plant liquids are not comparable.

USBM data were also used for imports by source and type. These data state imports by immediate, not ultimate source. Export data from the Organization of the Petroleum Exporting Countries, *Annual Statistical Bulletin*, 1972, were examined for comparative purposes. Their data for Algeria and Indonesia and, to a lesser extent, Venezuela, correspond to the USBM data reasonably closely. For the other countries the variation is considerable, the OPEC data often being 20 to 50 percent higher than the USBM data. The difference probably results from (1) the difference between immediate (USBM) and ultimate (OPEC) sources, and (2) the difference between announced (OPEC) and realized (USBM) destinations. No information was available to indicate the relative weight of each. Beginning with January 1974, import data have been available from the Federal Energy Administration. Since the FEA uses different definitions from those of the Bureau of Mines, however, FEA data are not strictly comparable with earlier import data.

The sources for the petroleum production data for other countries were OPEC, the USGS, and API, *Petroleum Facts and Figures*, 1971. All three sources were in strong agreement; the differences that occurred were generally in the 0.01 to 0.3 percent range. The OPEC bulletin is the only comprehensive source available for exports by all destinations. OPEC data on production by country and company were checked with the relevant corporate reports where possible. The former reflect long-run ownership shares; the latter often reflect short-run agreements, moderately diverging from the former.

Appendix C
IMPORTS OF CRUDE OIL AND PETROLEUM PRODUCTS INTO THE UNITED STATES
BY COUNTRY AND REGION, 1950-1973
(In million barrels)

Country	Item	1950	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973
Canada	Crude oil	--	16.4	43.2	53.8	30.7	34.1	41	65.9	85.1	91.9	102.8	108.2	127.1	151.6	169.4	203.5	245.3	263.4	343.8	404.0
	Products	0.1	0.7	2.3	3.0	1.3	1.9	--	3.5	5.2	4.8	6.5	9.8	13.1	12.6	15.9	18.3	34.5	49.4	61.8	75.2
Bahamas	Crude oil	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.5	1.9	0.7	1.1
	Products	--	--	--	--	--	--	--	--	--	--	--	--	--	0.1	0.3	--	11.0	52.9	62.8	61.2
Netherlands Antilles	Crude oil	--	0.2	0.8	0.4	8.0	4.2	5.7	8.2	4.9	3.7	2.2	3.1	1.2	0.2	2.9	6.0	6.2	6.0	3.0	3.0
	Products	98.8	98.7	100.6	101.4	118.3	118.6	110.6	107.6	112.1	108.9	119.8	128.5	124.8	130.8	140.2	157.9	168.0	150.4	152.4	206.4
Puerto Rico	Crude oil	--	--	--	--	--	--	13.0	15.9	16.8	16.0	17.1	17.1	22.3	21.6	24.3	26.3	30.2	4.3	5.4	5.4
	Products	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	30.5	31.8	30.9
Trinidad	Crude oil	1.0	--	0.7	1.4	3.7	3.4	2.2	2.4	2.2	2.1	3.5	3.1	2.9	2.1	3.1	2.9	0.5	0.3	8.9	24.3
	Products	2.0	0.5	1.0	2.1	8.9	8.9	15.7	26.4	28.4	38.4	38.9	45.1	52.9	58.2	66.1	75.7	78.4	66.3	73.7	67.1
Virgin Islands	Crude oil	--	--	--	--	--	--	--	--	--	--	--	--	--	0.9	2.2	9.6	9.8	9.7	13.8	9.3
	Products	--	--	--	--	--	--	--	--	--	--	--	--	--	12.5	26.3	33.0	59.0	89.8	107.1	110.9
Other Caribbean	Crude oil	16.5	8.9	6.2	3.3	1.0	0.2	0.8	8.3	10.5	10.6	10.6	11.5	10.5	10.7	11.9	10.8	10.1	9.1	6.8	4.5
	Products	1.1	13.8	16.0	11.7	13.3	14.8	5.4	7.1	9.4	10.4	8.6	7.3	7.8	8.9	7.7	8.2	9.8	3.3	4.9	4.5
Venezuela	Crude oil	107.8	149.8	170.9	196.5	177.0	180.6	180.5	158.3	179.8	183.7	184.4	166.6	159.5	143.9	131.2	116.6	107.5	119.8	102.1	139.7
	Products	19.9	51.2	60.3	79.0	92.1	108.2	121.3	128.0	146.8	144.8	157.2	196.3	212.0	198.3	193.4	202.8	253.7	251.9	249.1	270.8
Other So. America	Crude oil	15.7	9.4	10.2	8.9	10.3	12.5	15.8	11.8	10.3	10.3	9.6	15.2	15.7	20.3	21.3	22.7	8.3	4.2	7.4	19.0
	Products	--	--	--	0.7	1.6	0.6	0.1	0.9	1.0	3.1	3.0	6.3	7.9	10.0	11.6	10.1	9.9	7.8	7.1	8.3
Western Hemisphere Totals	Crude oil	141.0	184.7	232.0	264.3	230.7	235.0	246.0	254.9	292.8	302.3	313.1	307.7	316.9	329.7	342.0	372.1	388.2	418.7	491.9	610.3
	Products	121.9	164.9	180.2	199.8	245.5	267.0	289.2	289.4	317.7	326.4	351.1	410.4	440.8	453.0	485.8	532.3	656.5	702.3	750.7	835.3
Europe	Crude oil	--	--	--	0.2	0.9	0.4	0.2	0.3	0.8	1.5	0.9	0.7	1.1	1.2	0.9	1.3	0.1	--	1.4	2.9
	Products	0.5	0.1	--	0.2	1.9	1.6	0.2	0.7	0.7	0.8	0.5	0.7	1.0	1.7	1.9	44.5	64.3	49.2	64.7	102.4
Iran	Crude oil	0.1	3.1	6.2	5.2	5.8	9.7	12.4	22.2	19.0	22.8	24.3	28.9	34.6	24.3	21.4	15.6	12.7	39.1	49.7	79.3
	Products	--	--	--	--	--	--	--	--	--	--	--	0.2	0.8	1.7	0.9	1.3	1.3	1.7	2.2	2.0
Kuwait	Crude oil	26.2	56.3	52.3	59.4	82.9	77.5	64.7	54.7	46.4	32.6	25.4	22.1	10.4	8.3	17.6	14.2	13.2	13.1	15.3	15.5
	Products	0.2	--	--	--	2.4	5.9	1.9	--	0.2	--	--	--	1.1	0.1	--	--	--	0.1	1.1	1.4
Saudi Arabia	Crude oil	14.0	29.6	29.2	12.6	27.2	26.2	30.0	24.2	32.6	29.6	36.5	50.0	47.7	30.6	19.2	12.7	14.5	42.9	65.0	172.0
	Products	0.9	0.5	1.3	1.7	1.0	0.1	0.8	2.3	1.7	1.9	2.6	2.8	2.4	0.8	2.6	3.2	0.5	3.7	4.4	5.5
Other Middle East	Crude oil	0.1	12.5	16.4	7.9	11.1	9.5	9.6	22.7	13.7	22.6	26.5	26.4	21.4	7.8	16.6	21.1	23.0	33.1	30.9	31.1
	Products	1.2	0.1	0.6	1.2	2.7	0.4	1.6	0.5	0.4	1.2	1.0	0.7	1.0	2.8	1.7	2.4	1.8	5.0	4.3	5.1

Appendix C--continued

Country	Item	1950	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973
Algeria	Crude oil	--	--	--	--	--	--	0.3	--	--	0.4	2.2	3.3	1.4	1.4	1.9	0.4	2.1	4.7	31.8	43.6
	Products	--	--	--	--	--	--	--	--	--	--	--	--	--	0.3	0.1	0.4	1.0	0.9	2.1	5.3
Libya	Crude oil	--	--	--	--	--	--	--	--	6.2	7.0	14.4	15.2	25.2	15.3	41.6	48.9	17.2	19.4	40.1	48.6
	Products	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.3	0.1	1.8	4.8	11.4
Nigeria	Crude oil	--	--	--	--	--	--	--	--	--	--	--	5.3	4.1	1.4	3.1	18.0	17.5	34.8	88.9	163.7
	Products	--	--	--	--	--	--	--	--	--	--	--	--	--	0.4	--	--	0.6	2.5	2.9	3.8
Other Africa	Crude oil	--	--	--	--	--	--	1.2	1.6	3.3	1.8	2.1	2.1	1.2	2.0	10.8	15.2	7.6	9.4	11.4	29.6
	Products	--	--	--	--	--	--	--	--	--	--	--	--	--	2.0	0.9	6.7	0.3	0.5	1.1	1.1
Indonesia	Crude oil	--	11.8	13.2	24.2	23.8	24.2	28.1	22.8	24.3	23.0	24.8	23.0	19.5	24.3	26.6	32.3	25.7	40.2	59.6	73.1
	Products	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.4	0.6	4.5
Other Asia	Crude oil	--	--	--	--	--	1.0	1.5	2.0	1.3	0.7	1.0	1.3	1.9	0.4	--	0.3	0.7	0.6	1.8	1.3
	Products	--	--	--	--	--	0.3	0.4	0.2	0.1	--	--	0.1	--	--	--	1.1	0.3	3.7	5.3	12.7
Oceania	Crude oil	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2.6	0.5	0.2
	Products	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.7	2.8	1.3
Eastern Hemisphere Totals	Crude oil	40.4	113.2	117.3	99.7	149.2	145.4	146.0	150.6	147.8	142.1	158.1	178.0	165.5	117.2	159.7	176.8	134.4	239.9	396.4	661.3
	Products	3.5	0.7	1.3	2.9	10.5	11.4	6.8	3.7	3.1	3.9	4.4	4.6	16.0	25.9	50.9	70.4	70.3	69.7	96.3	156.6
World	Crude oil	181.4	297.9	349.3	374.0	379.9	380.4	392.0	405.5	440.6	444.4	471.2	485.7	482.4	446.9	501.7	551.9	522.6	658.6	888.3	1271.6
	Products	125.4	165.6	181.5	202.7	256.0	278.4	276.0	293.1	300.8	330.3	355.5	415.0	436.8	478.9	536.7	602.7	724.8	772.0	847.0	991.9
OPEC direct	Crude oil	170.4	314.9	350.4	387.7	436.0	442.3	450.9	435.7	471.3	469.6	499.3	540.8	538.1	461.7	477.9	490.2	493.4	582.0	754.9	1075.8
	Products	2.3	0.6	1.9	2.9	6.1	6.4	4.3	2.8	2.3	3.1	3.6	3.5	4.5	4.0	3.4	6.3	3.4	11.5	16.7	27.6
OPEC Direct	Crude oil	40.3	98.4	97.9	79.9	121.2	113.2	105.8	103.2	102.4	94.0	107.1	119.1	107.3	64.7	107.7	112.1	77.6	120.1	186.2	316.6
	Products	2.3	0.6	1.9	2.9	6.1	6.4	4.3	2.8	2.3	3.1	3.6	3.5	4.5	4.0	3.4	6.3	3.4	11.5	16.7	27.6
OPEC Direct	Crude oil	42.6	99.0	99.8	82.8	127.3	119.6	110.1	106.0	104.7	97.1	110.7	122.6	111.8	68.7	111.1	118.4	81.0	131.6	202.9	344.2
	Products	2.3	0.6	1.9	2.9	6.1	6.4	4.3	2.8	2.3	3.1	3.6	3.5	4.5	4.0	3.4	6.3	3.4	11.5	16.7	27.6

SOURCE: U.S. Bureau of Mines. (See App. 8)

NOTE: Crude oil includes plant condensate and unfinished oils.